

SIEMENS

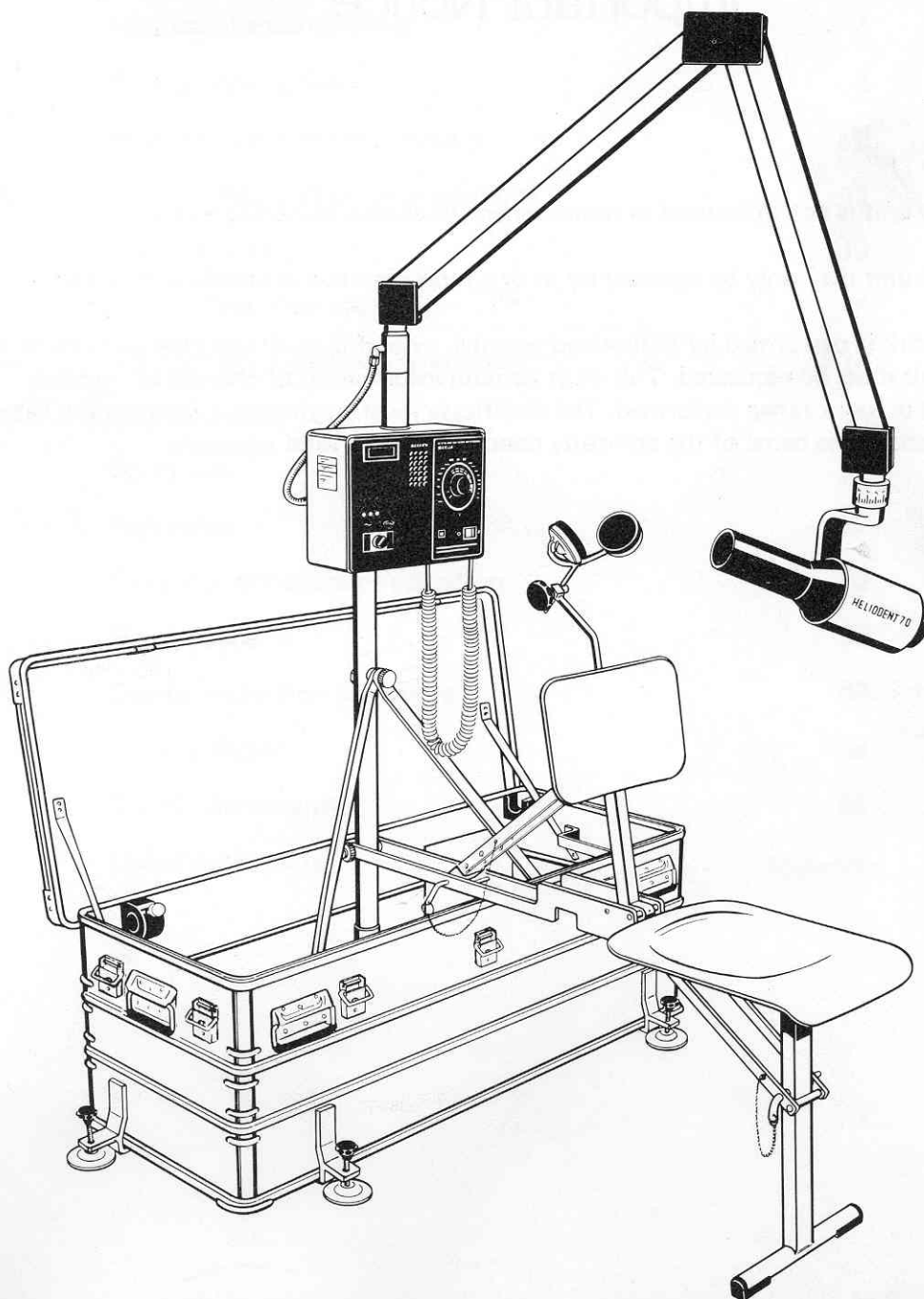
PORTARAY

HELIODENT[®] 70

with **DENTOTIME**

Model D3152 50/60 HZ Operation

Maintenance Instructions



Important Notice

This unit is not to be used in rooms where an explosion hazard exists.

This unit may only be repaired by us or a representative expressly authorized by us.

If work is performed by authorized persons, a certificate on the type and extent of repair must be requested. This must contain information of changes of nominal data or work range performed. The certificate must furthermore indicate the date of repair, the name of the company concerned and a valid signature.

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Description of the equipment

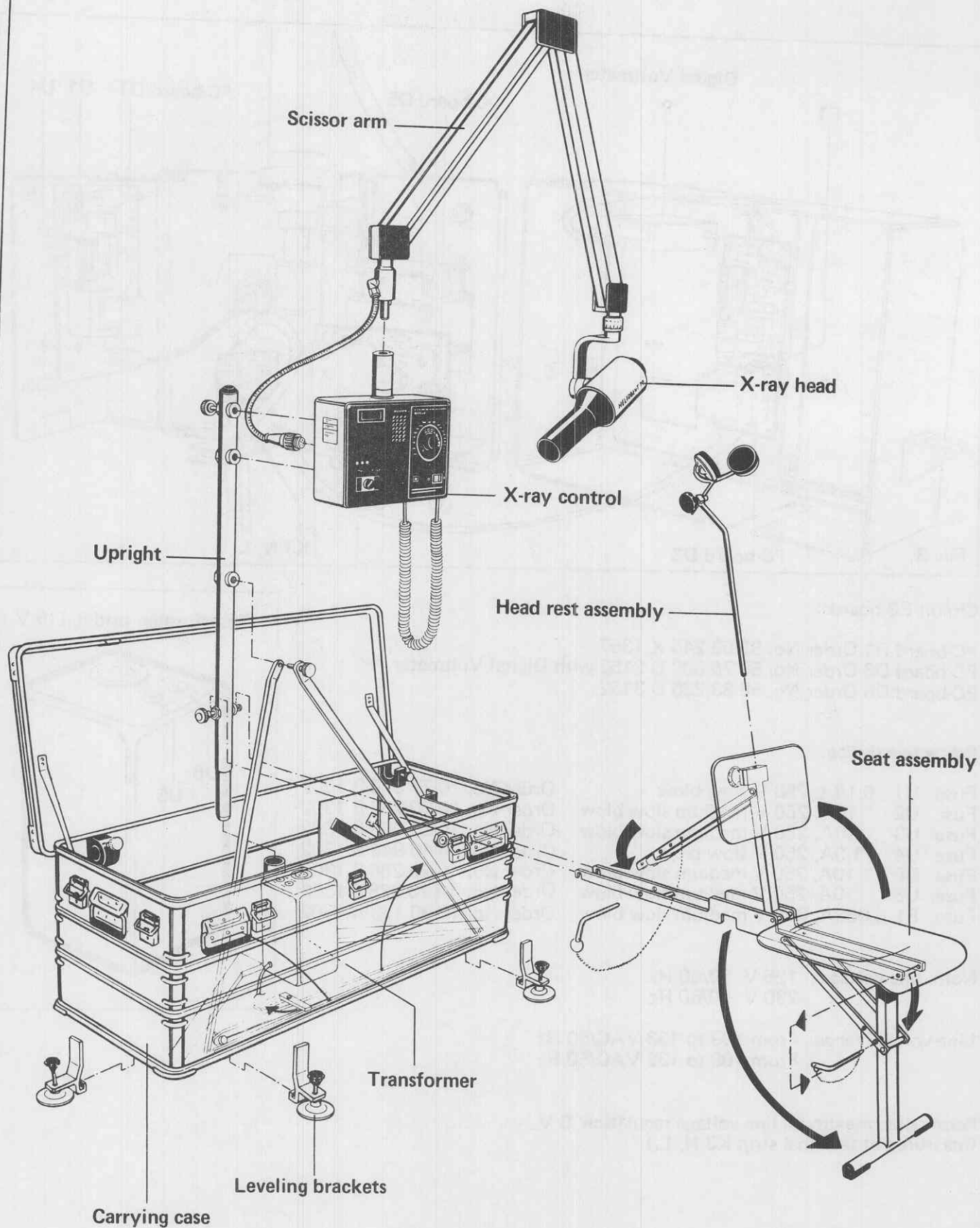
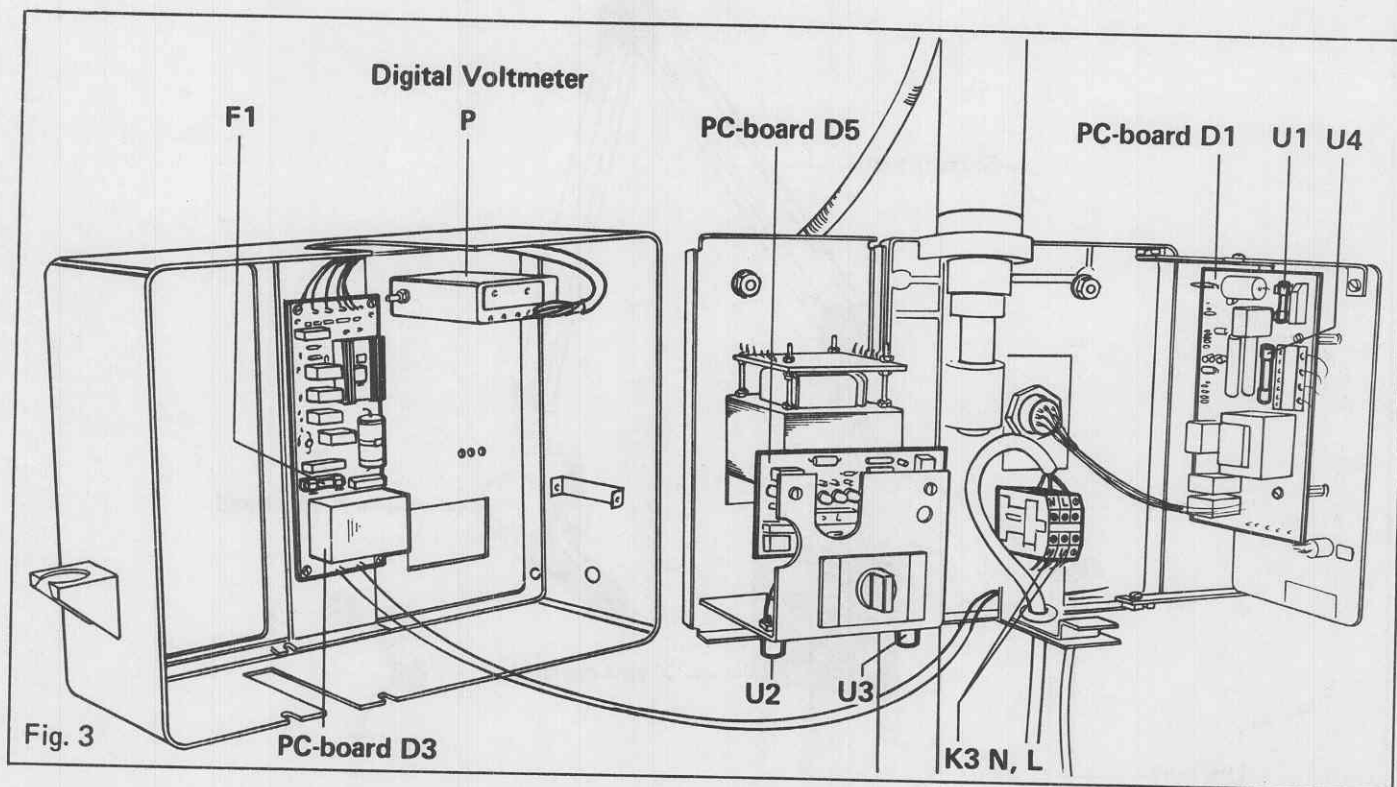


Fig. 2

EQUIPMENT SPECIFICATIONS

Power requirement



Circuit PC boards:

PC-board D1 Order No. 83 53 245 X 1357

PC-board D3 Order No. 58 75 802 D 3152 with Digital-Voltmeter "P"

PC-board D5 Order No. 58 83 236 D 3152

Protective device:

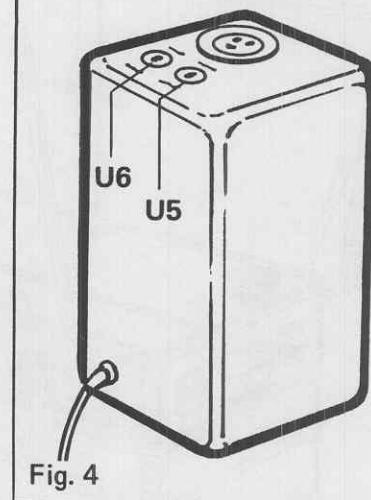
Fuse U1	0,16A, 250 V slow blow	Order No. 10 77 379 B 1302
Fuse U2	10A, 250 V medium slow blow	Order No. 10 20 288 B 1302
Fuse U3	10A, 250 V medium slow blow	Order No. 10 20 288 B 1302
Fuse U4	1,5A, 250 V slow blow	Order No. 10 40 948 B 1302
Fuse U5	10A, 250 V medium slow blow	Order No. 10 20 288 B 1302
Fuse U6	10A, 250 V medium slow blow	Order No. 10 20 288 B 1302
Fuse F1	0,063A, 250 V medium slow blow	Order No. 10 90 133 B 1302

Nom. line voltage 125 V 50/60 Hz
or 230 V 50/60 Hz

Line voltage range: From 109 to 133 VAC/60 Hz
From 109 to 132 VAC/50 Hz

Permissible maximum line voltage regulation 6 V
(measured at terminal strip K3 N, L.)

Transformer outlet 115 V



PHYSICAL DESCRIPTION

X-ray control:

Weight: 15,4 Lbs. (7 kg)

Consists of:

- Base plate,
- Line compensation transformer T3 with instrument circuit PC board D5.
- Power supply PC board D3 and digital instrument P.
- Object/exposure time assembly with PC board D1.

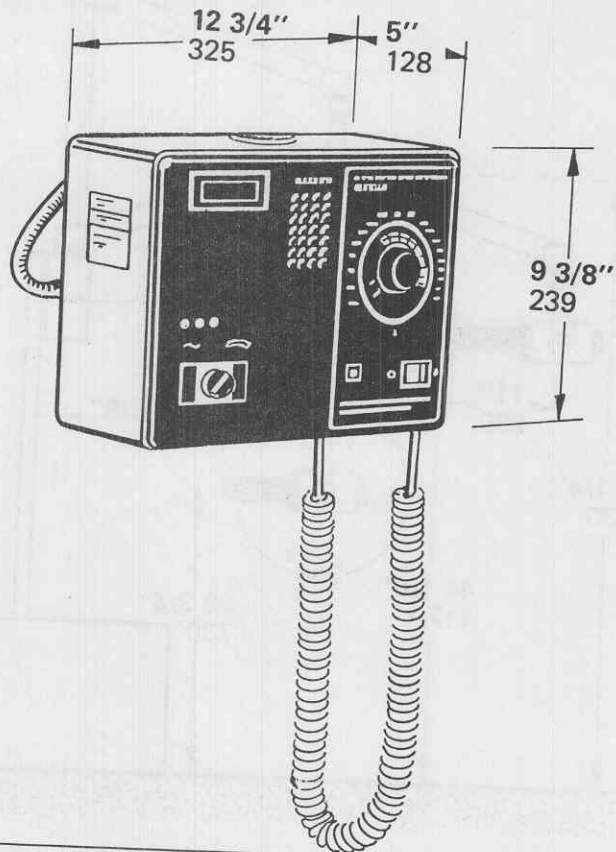


Fig. 5

X-ray head:

Weight: 11 Lbs. (5 kg)

Consists of:

- High tension transformer H1.
- High voltage capacitor C1.
- Voltage doubling circuit V10.
- X-ray tube.
- Oil filled aluminum housing for insulation and cooling of the above components.
- Lead shielded collimator.

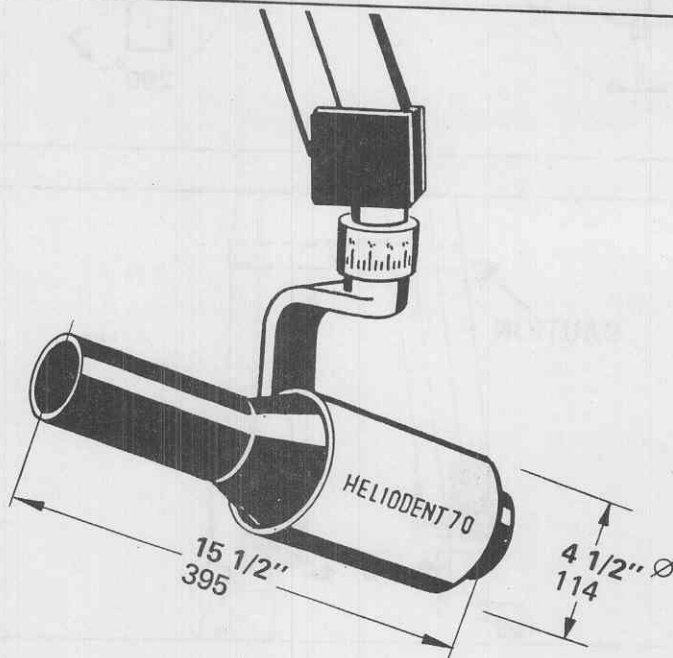


Fig. 6

Scissor arm:

Spring loaded scissor to support the X-ray head in a drift-free condition over an operating range as shown in the dimensional drawing.

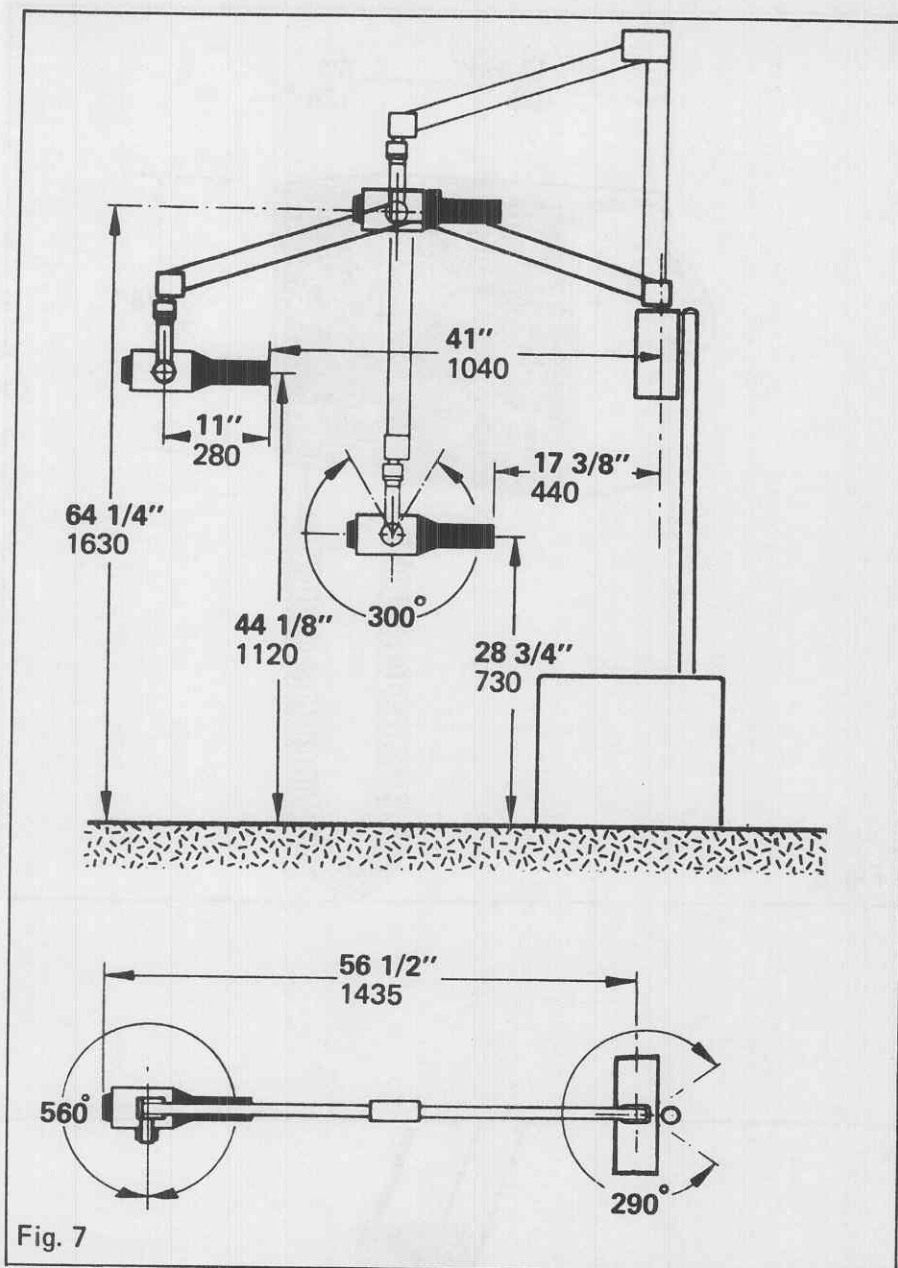


Fig. 7

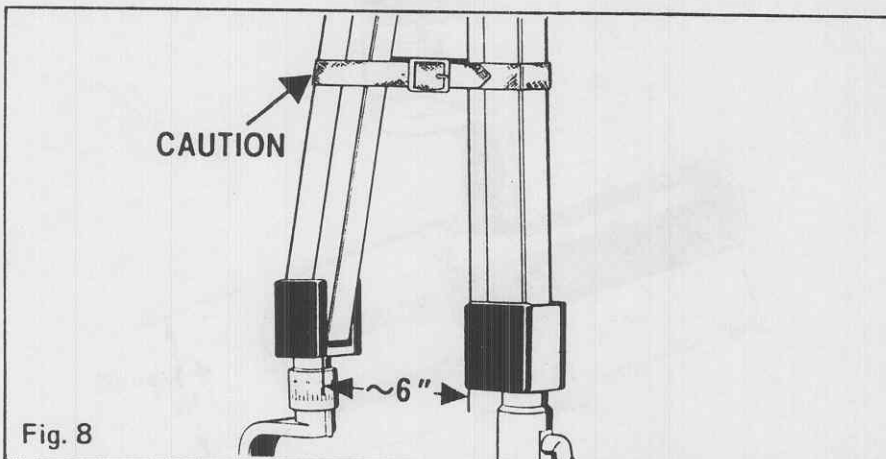


Fig. 8

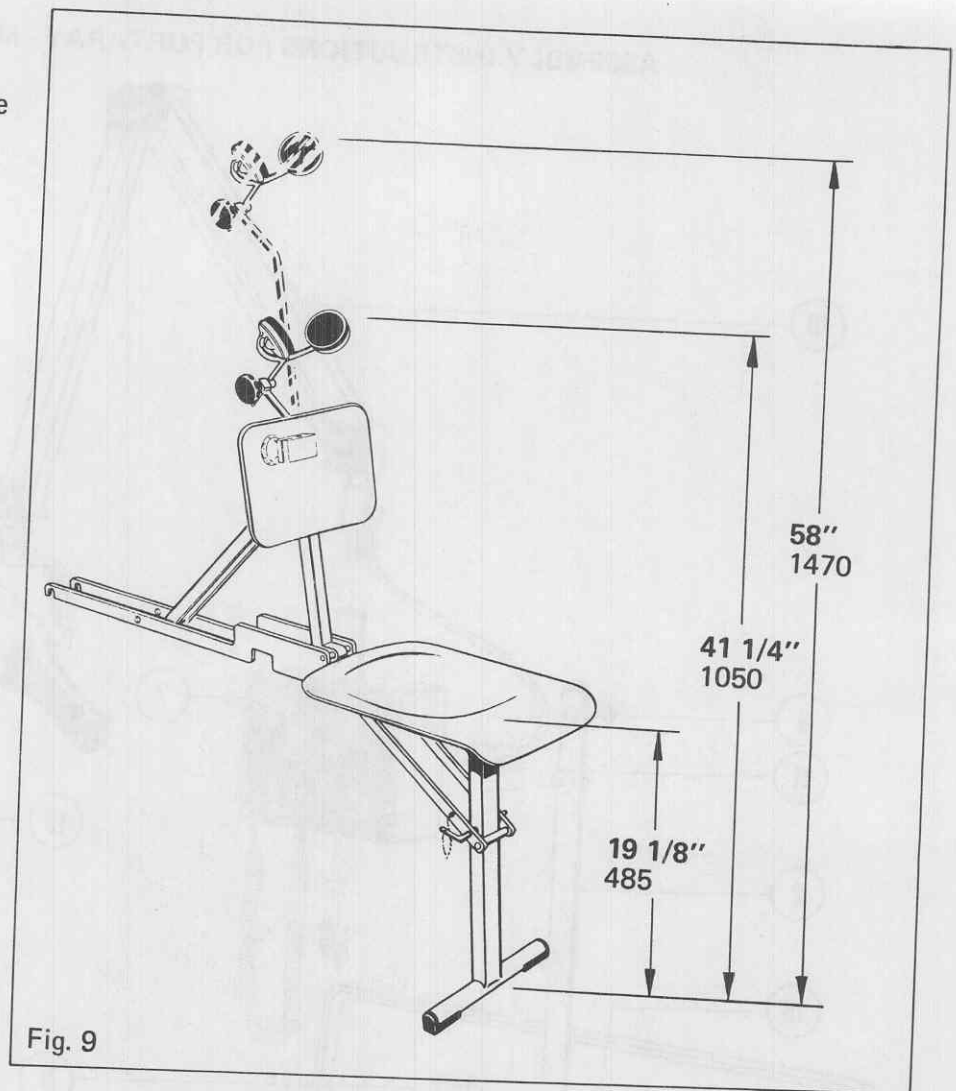
Caution:

Removal of the X-ray head requires securing the scissor arm in a semi opened position to prevent accidental opening (spring loaded).

A five conductor wiring harness connects the X-ray head to the X-ray control.

Patient seat assembly:
Weight: 30,8 Lbs. (14 kg)

Metal constructions with pressure treated seat and backrest.

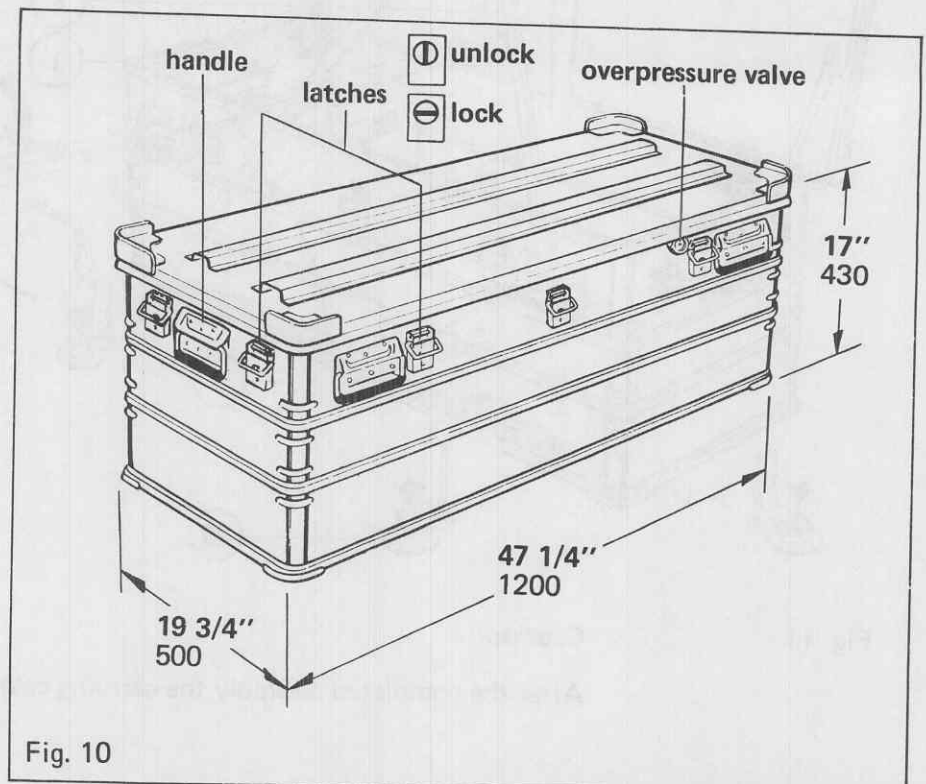


Carrying case:

Weight with mounting devices and support structure: 92,5 Lbs. (42 kg)

Aluminum case finished with aliphatic polyurethane, chemical agent resistant paint, color forest green, with 6 carrying handles. The case lid is secured with 10 lockable latches.

The case is waterproof and fitted with an overpressure valve.



ASSEMBLY INSTRUCTIONS FOR PORTARAY - MODEL D 3152

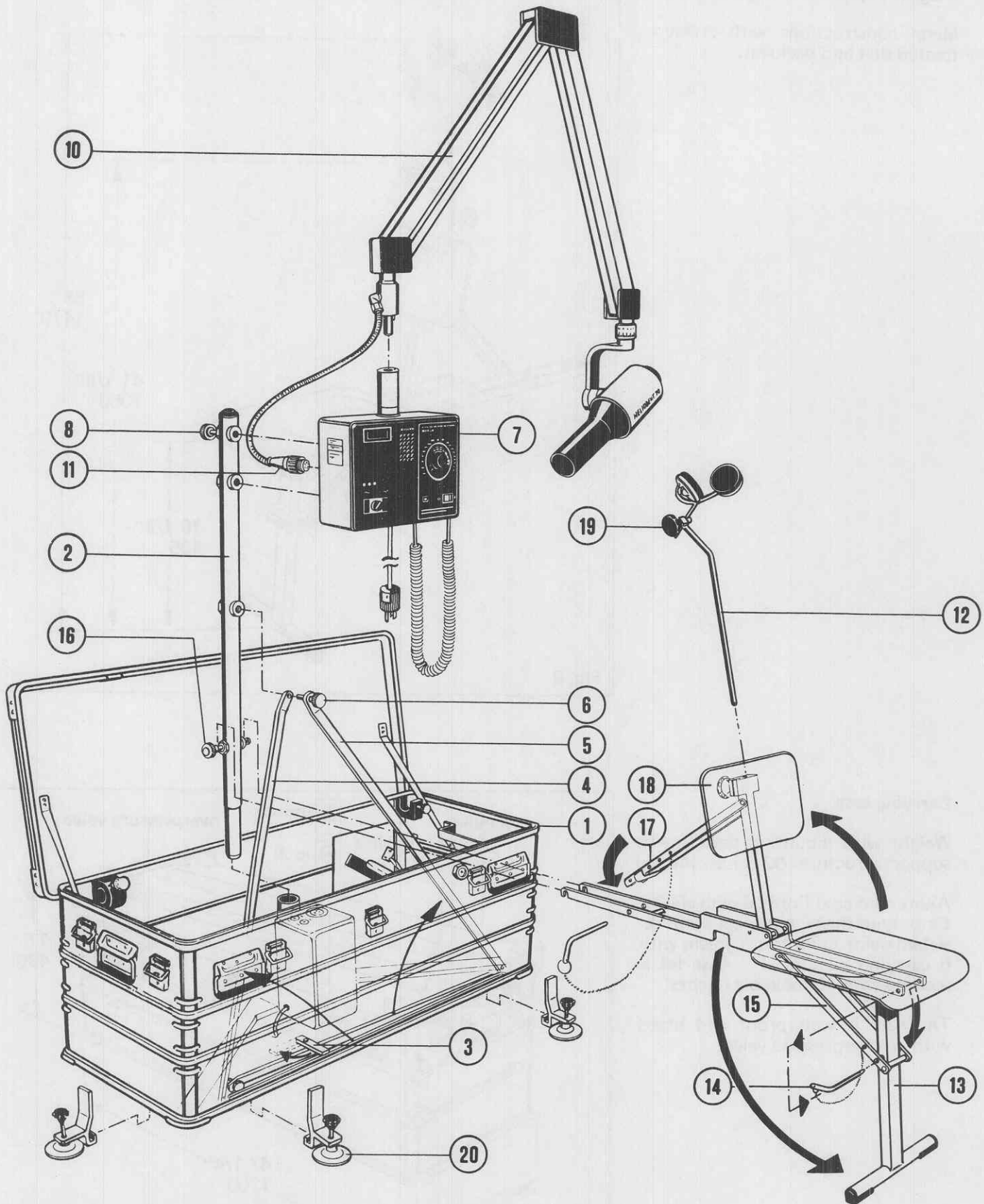


Fig. 11

Caution:

After the completed assembly the carrying case must be leveled.

Set-up

1

Remove all components from carrying case (1).

Lay out components keeping numbers in sequence.

Insert upright (2) into base, swing bracket (3) in the direction of the arrow.

Lift support bars (4) and (5), secure same in upright as shown with knob (6).

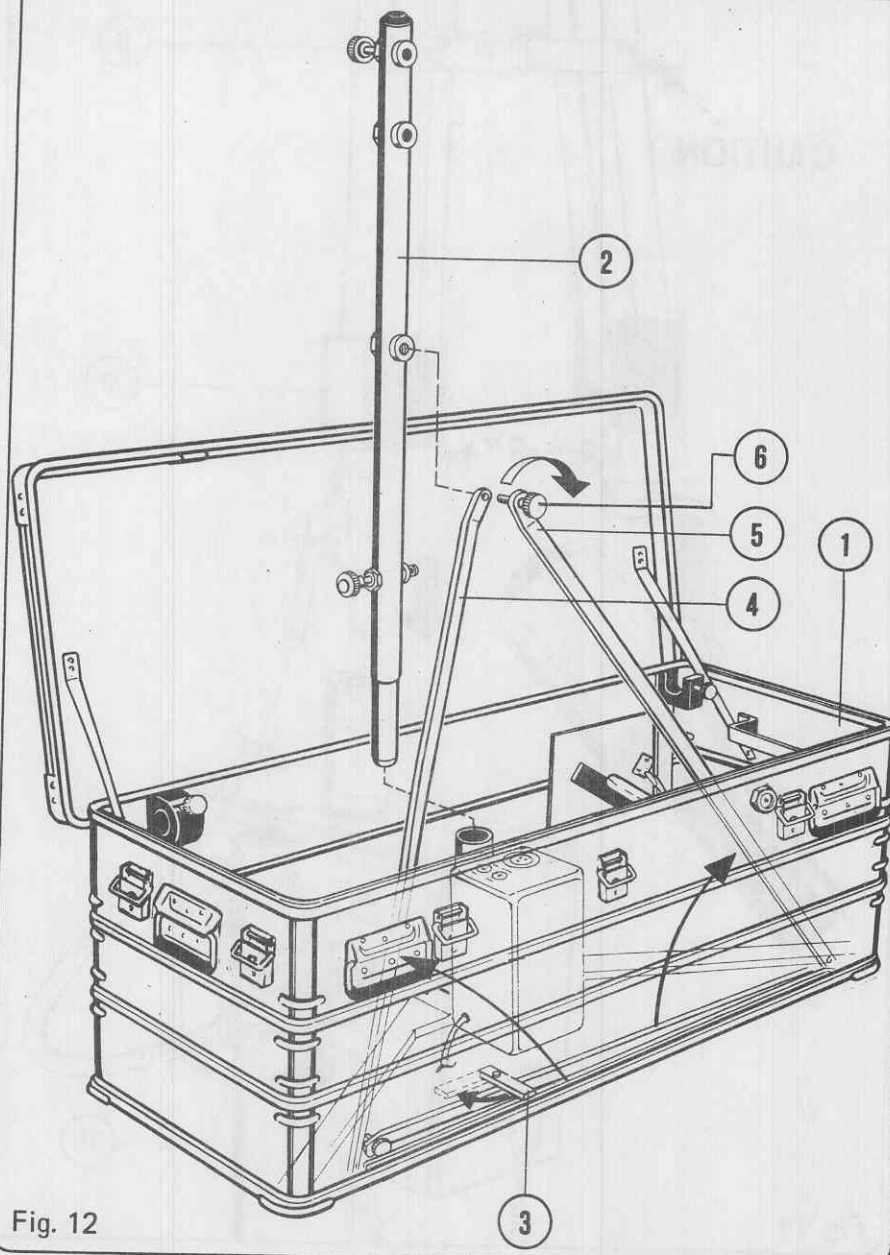


Fig. 12

2

Engage dowel pins of X-Ray control adapter (7) in upright, secure with knob (8).

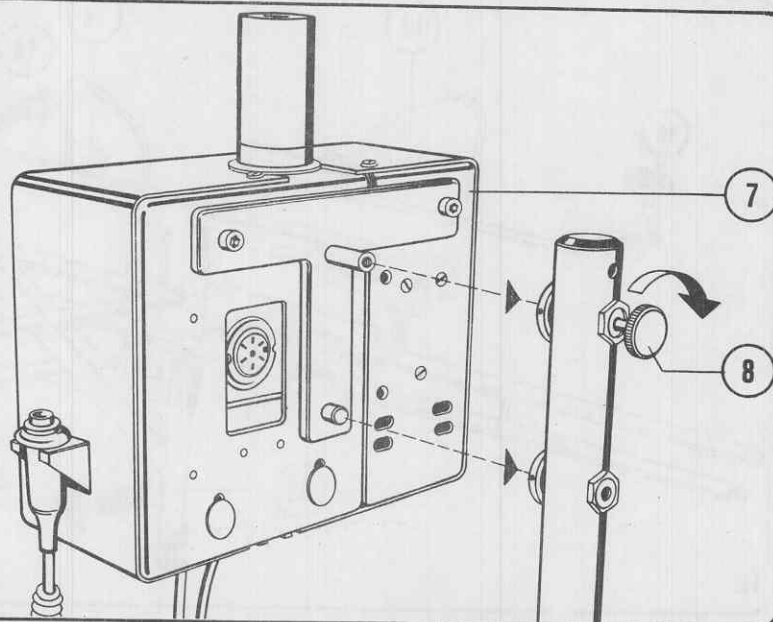


Fig. 13

3

Loosen safety strap (9) to permit a 6" opening of the scissor arm (10) before engaging the arm in the coupling as shown.

CAUTION! To prevent accidental opening of the spring loaded scissor arm, causing injury and arm damage. **DO NOT REMOVE** safety strap completely, unless the arm is fully engaged in the coupling.

Connect multi pin plug (11) secure with lock ring in direction of arrow.

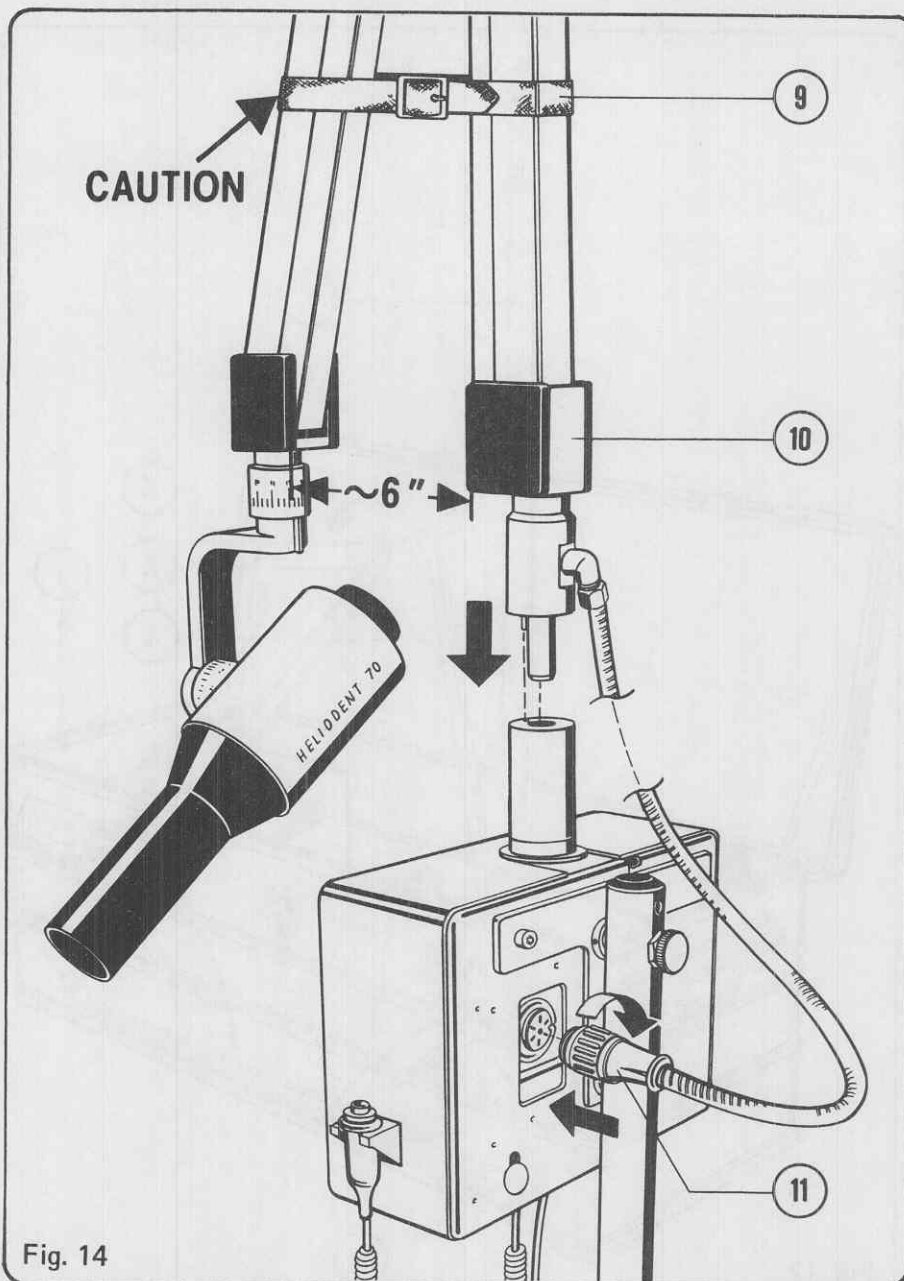


Fig. 14

4

Loosen knob (18), remove headrest assembly (12) from storage position. Remove safety pin (14). Unfold stool leg (13) and retainer bracket (15). With stool leg fully extended secure same with safety pin as shown see detail.

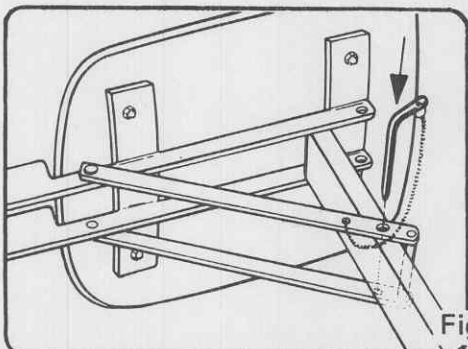
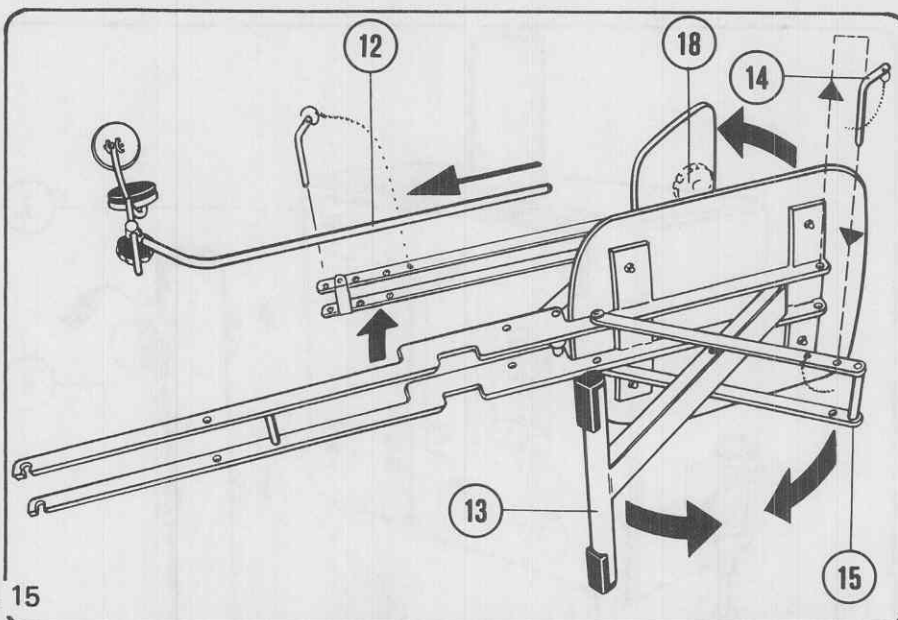


Fig. 15



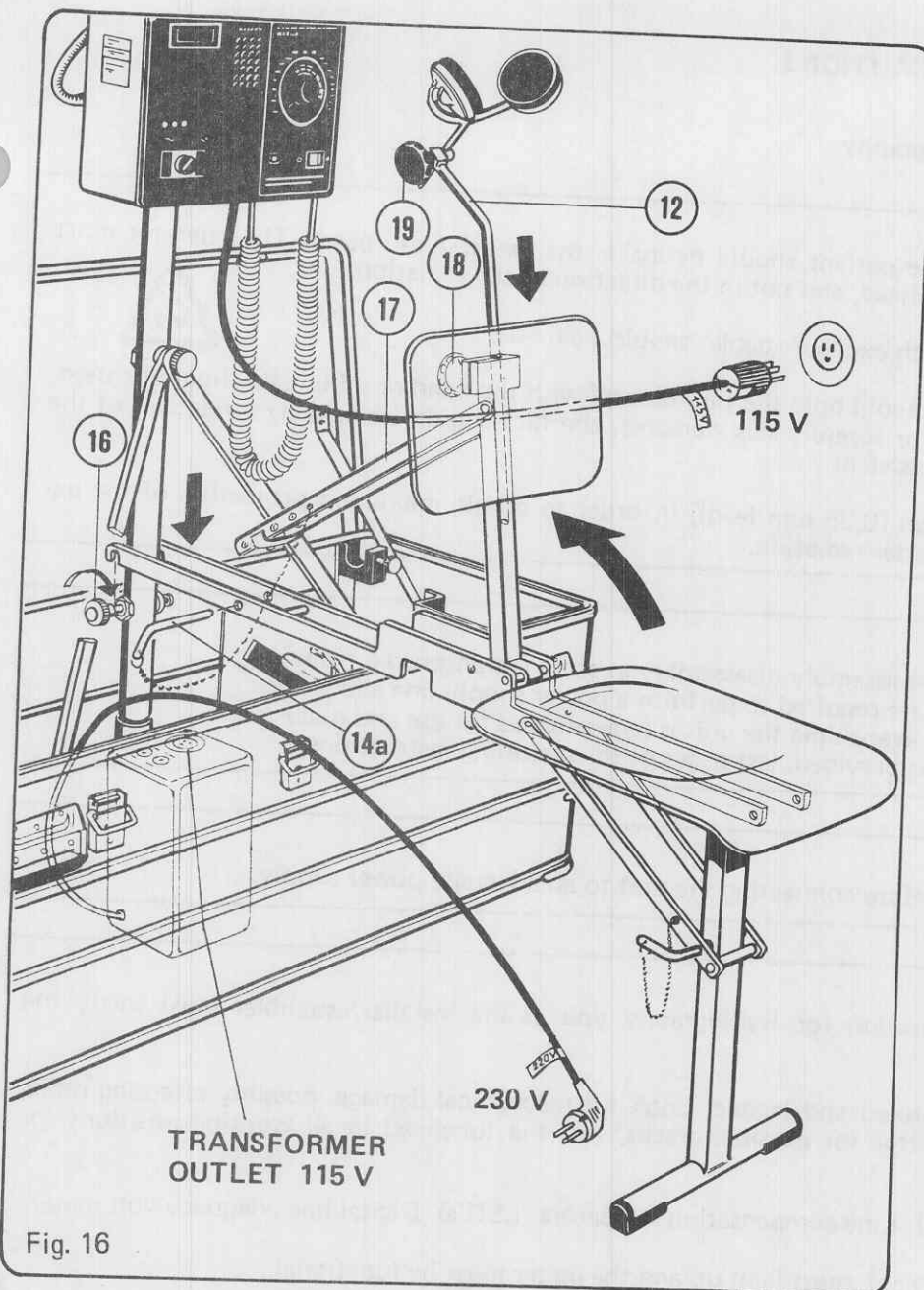


Fig. 16

5

Engage stool support in upright, secure with knob (16). Raise backrest in direction of arrow. Position backrest with backrest brace (17) (3 positions) and secure with safety pin (14a). Insert headrest assembly (12), secure with knob (18) (headrest height adjustment).

Adjust headrest cradle position with knob (19).

When the power supply is 115 V:
Connect the power cord directly into the 115 V wall outlet.

When the power supply is 230 V:
Connect the power cord at the transformer's 115 V outlet and connect the transformer's power cord into the 230 V wall outlet.

In case of a portable gasoline-diesel driven generator this generator must meet the following technical characteristics:

- Power rating: 5 kVA,
- Volts: 230 V nominal, single phase
- Max. permissible deviation: 207 to 253 VAC
- Max. permissible fluctuation of line voltage during standby: 1.5 % at 230 VAC.

6

Level carrying case and upright with the aid of 3-leveling brackets (20).

The leveling brackets hook to the lower carrying case frame.

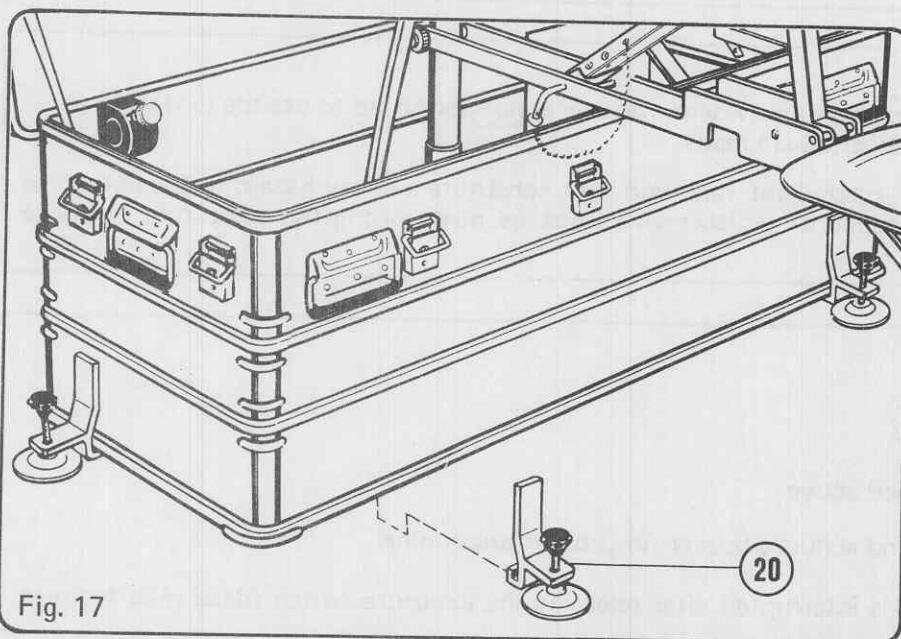


Fig. 17

PATIENT SAFETY AND OTHER PRECAUTIONS

Radiation protection for intraoral radiography

WARNING

During the exposure, nobody but the patient should be inside the useful X-ray beam. The operator must be at least 6 feet away from the X-ray head, and not in the direction of the radiation.



Full use of the length of the handswitch exposure cable should be made.

For dental radiography, the patient should hold the film himself with the hand or a film clip should be used. If this is not possible (with children or severely sick persons), the film should be held by a relative of the patient but not by the dentist or his assistant.

We recommend, the use of lead apron (0,25 mm lead), in order to obtain maximum protection of the patient's reproductive organs against scatter radiation.

WARNING

Since the Portable X-ray unit requires assembly-disassembly as same is transported from location to location, you the USER are required to perform a power supply line adequacy test as outlined in these instructions **every time** the unit is re-assembled for use and document same on the TEST RECORD as provided, last pages of the operating instructions.

WARNING

Visual checks **must** be performed **before** connecting the unit to an adequate power supply.

WARNING

When the unit is set-up in preparation for Radiography you as the installer/assembler **must** verify the following:

1. Verify that all labels are affixed and legible. Look for mechanical damage, possibly affecting radiation safety, (inspect collimator for possible cracks, test the tubehead in all working positions for possible drift).
2. Operating-ready light (green). Line compensation indicators (LED's). Digital line adequacy volt meter.

The operating-ready light (green) **must** light up and the meter **must** be functional.

WARNING

Mechanical damage affecting radiation safety be evident, the user is **not** permitted to use the unit until repairs or replacements, correcting the defect(s), are made.

Defective bulbs for power "on" light, ready light, radiation light constitute a safety hazard to the patient as well as to the operator, therefore, repairs or replacements **must** be made promptly, same rule as above applies.

During line adequacy tests:

WARNING

Observe radiation protection as outlined above

1. Check radiation warning light and acoustic buzzer for proper functioning.
2. Make sure the X-ray exposure is interrupted after releasing the exposure switch (dead man feature).

EQUIPMENT CARE

All equipment surfaces shall be wiped with a damp lintfree cloth once a week.

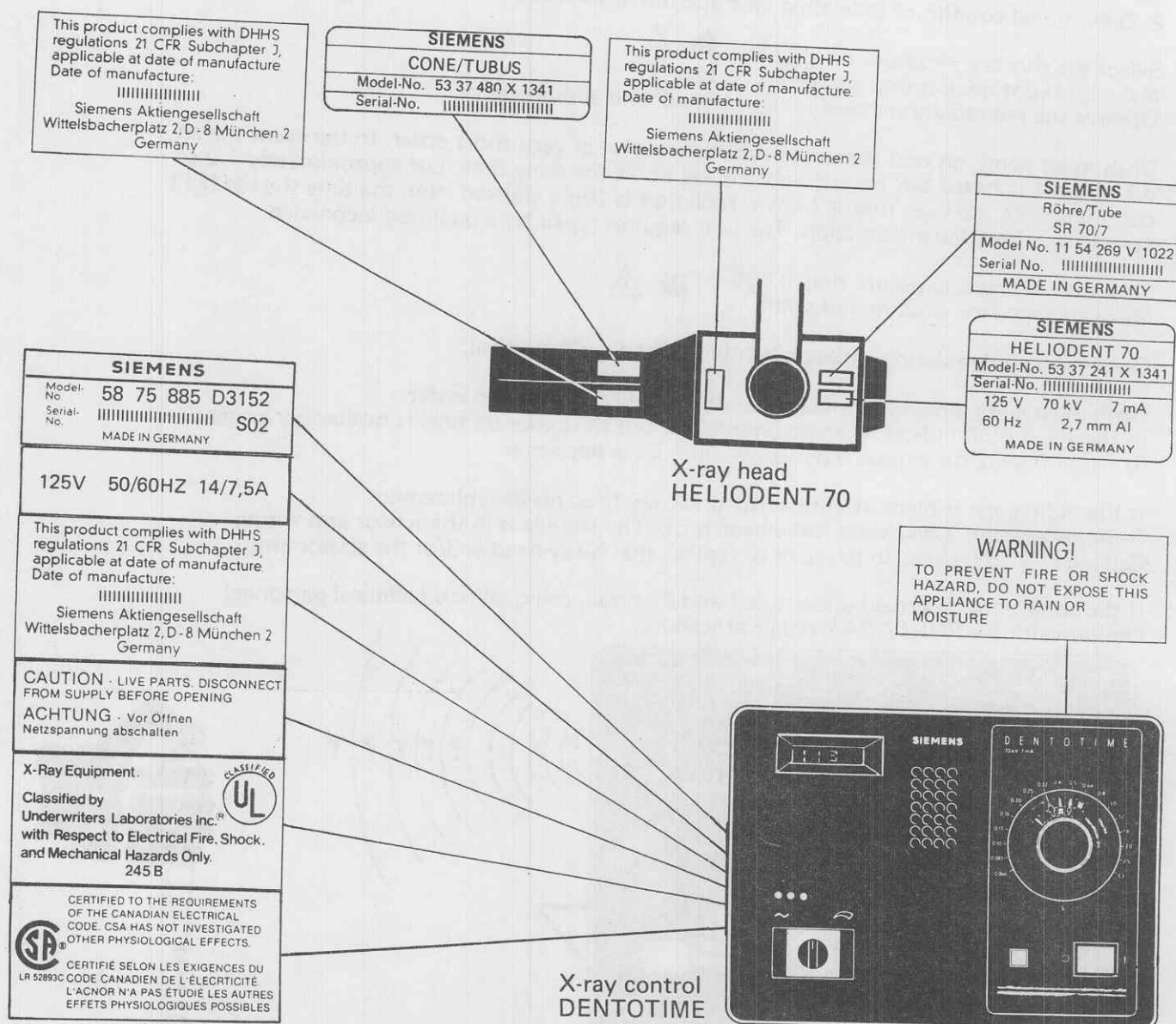
Visual checks and tests before the unit is operated:

1. Verify that all labels are affixed and legible. Look for mechanical damage, possibly affecting radiation safety.
2. Inspect components for tightness, rust, cracks, wear, fraying electrical cords, missing parts and operators publication.
3. Test tube head in all working positions for possible drift.
4. Operating-ready light (green). Line compensation indicators (LED's). Digital line adequacy volt meter.

The operating-ready light (green) **must** light up and the meter **must** be functional.

Should mechanical damage affecting radiation safety be evident, the user is not permitted to use the apparatus until repair or replacements, correcting the defects are made.

How to find product labels



ALERTS / TROUBLESHOOTING

The following operational tests are carried out with the PORTARAY in a ready to operate condition.

1. Testing of the deadman feature

The deadman feature permits the premature immediate termination of X-rays.

- Set the object/exposure time selector to 3.2 seconds.
- Cover the collimator with cover cap (lead) No. 58 83 194 (Radiation protection).
- With the exposure button maintain a distance of at least 6FT from the X-ray head (Caution X-ray!) during exposure.
- Make an exposure. Count 5001 (fivethousandone) which equals approximately one second. Release the exposure button — the audible and visible radiation indicators must terminate immediately.
- In the event the radiation visible and audible indicators do not stop, disconnect the unit from the power supply immediately — call qualified service personnel familiar with the PORTARAY to repair this defect (exchange the DENTOTIME PC board D1 and adjust as indicated on page 43).

2. Operational conditions indicating improper timer function

Select the shortest exposure time 0.066.



Make an exposure. Caution radiation.

Observe the red radiation emission light (visual) and audible signal.

Both must come on and terminate simultaneously in very short order. In the event the audible signal is heard but no red light comes on at the same time, but approximately 1/2 second later the pre-heat fuse is blown, radiation is being emitted from the time the red light comes on — insufficient emission. The unit requires repair by a qualified technician.

Select the shortest exposure time 0.066.



Make an exposure. Caution radiation.

Observe the red radiation emission light(visual)and audible signal.

Both must come on and terminate simultaneously in very short order.

In the event both indicators come on together but the exposure time is noticeably longer (0.7 to 1.0 second), expose a periapical film. Develop same.

If the radiograph is blank (transparent) the X-ray head needs replacement.

If the radiograph is black the X-ray head is ok. The trouble is in the scissor arm wiring.

Call a qualified technician to repair or replace the X-ray head and/or the scissor arm.

If the conditions described under test 1 and 2 prevail, call qualified technical personnel familiar with the PORTARAY repair procedure.

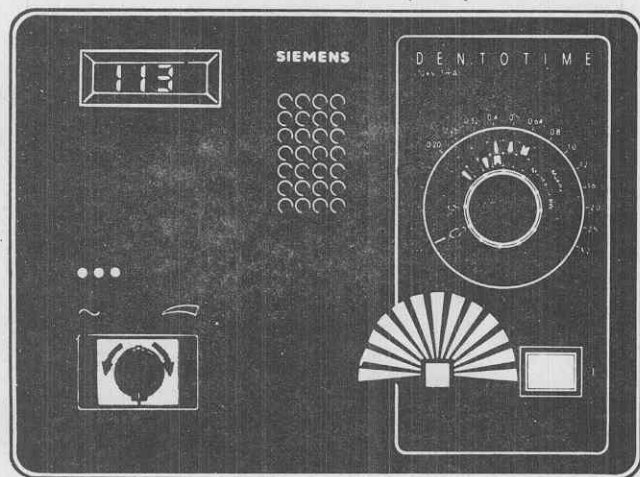
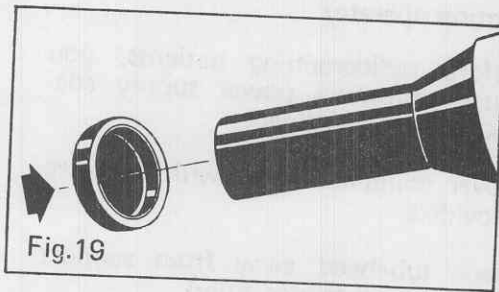
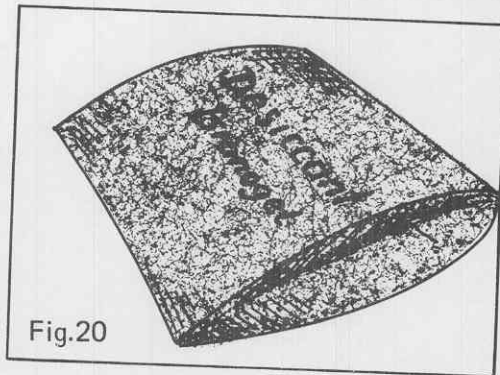


Fig.18

ACCESSORIES



Lead cap provided for the line adequacy test.



Desiccant bag to absorb moisture accumulated during storage.

EQUIPMENT WARRANTY

Siemens dental equipment is warranted against defects in material and workmanship for a period of one year from the date of installation, provided all installation and subsequent service is performed by an authorized Siemens dental dealer or technician. Siemens' warranty is subject to the following conditions: (1) Siemens must receive prompt notice of any defect within the warranty period; (2) if equipment must be returned to Siemens for repair, transportation charges to the location designated by Siemens must be prepaid; (3) Siemens' examination must show that the defect occurred in the course of normal use and was not the result of misuse, abuse, accident or neglect. Subject to these conditions, Siemens' will under its warranty repair or replace (at Siemens' option) any defective parts. Siemens' warranty extends only to the original purchase of the equipment and is not interrupted or prolonged by any repair or replacement provided pursuant to such warranty.

SIEMENS MAKES NO WARRANTY OTHER THAN THE ONE SET FORTH ABOVE, SUCH WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THOSE OF FITNESS AND MERCHANTABILITY.

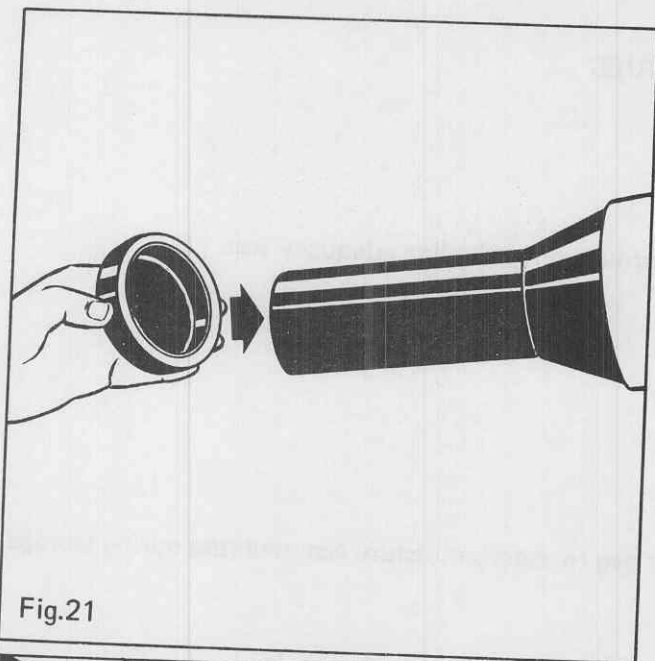


Fig.21

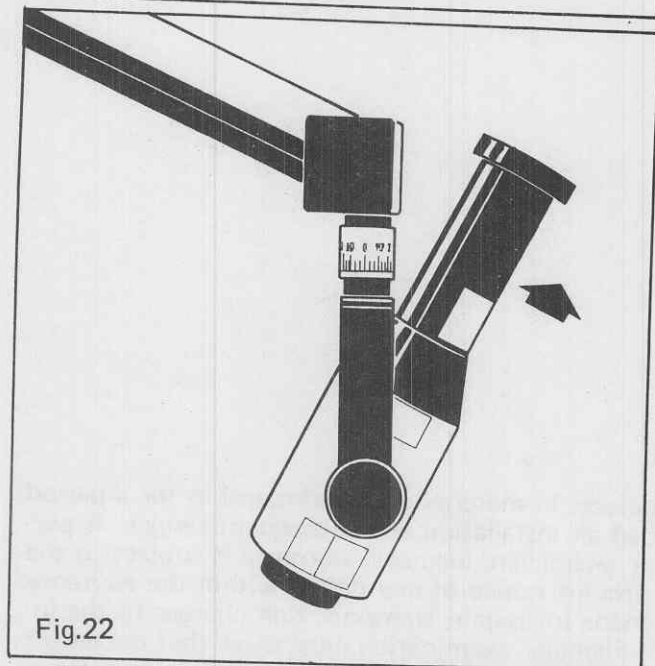


Fig.22

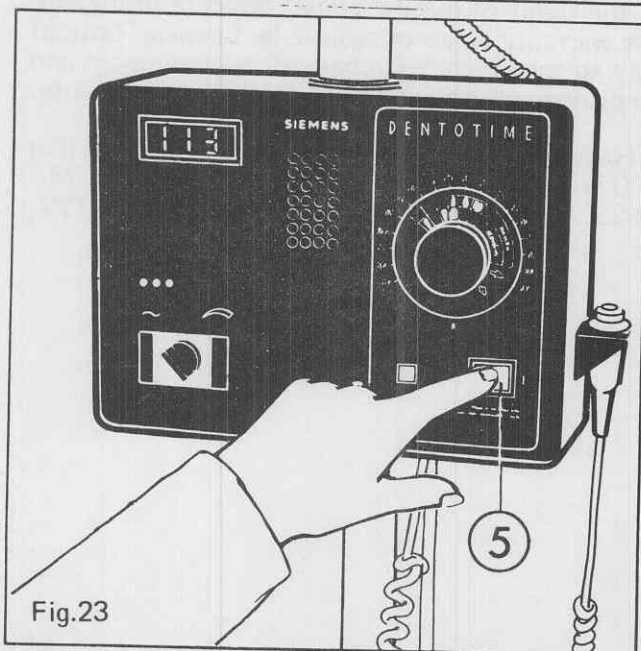


Fig.23

LINE ADEQUACY TEST

Attention operator

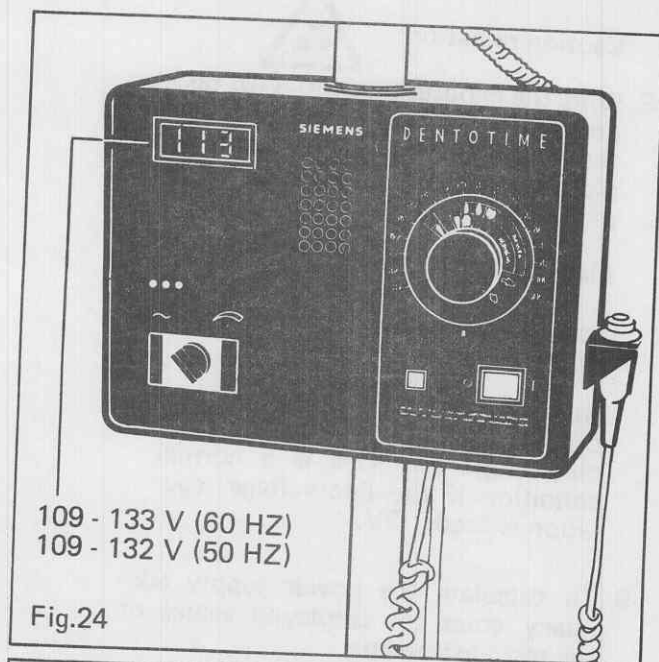
Before radiographing patients, you must perform a power supply adequacy test as outlined:

1. Cover collimator port with lead cap provided.
2. Place tubehead away from support stand (arm extended fully).

3. Plug in powercord (see set-up page 11).

WARNING—power supply must be grounded.

4. Switch on X-ray control with switch (5)
Power on — switch lights up (Green)



109 - 133 V (60 HZ)
109 - 132 V (50 HZ)

Fig.24

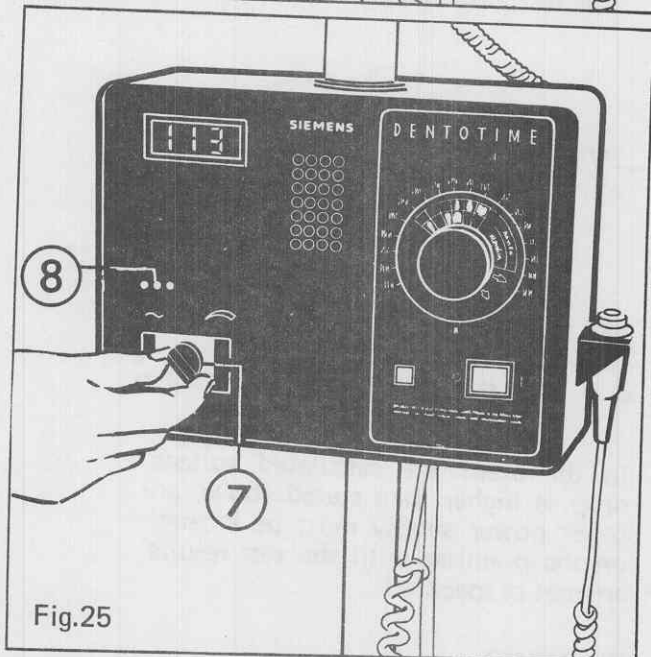


Fig.25

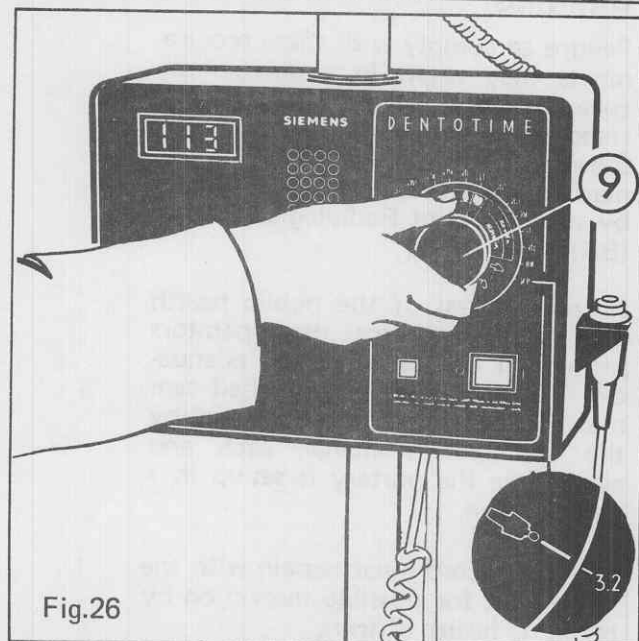


Fig.26

5. The digital power supply test instrument must read between:

min 109,0 V	133,0 V max. at 60 HZ
min 109,0 V	132,0 V max. at 50 HZ

After 5 minutes note value displayed on the test instrument, on test record (test records see Operating Instructions, appendix).

6. Verify that the green light diode (8) is lit:
- | | | |
|-----------|-------|------------|
| Yellow | Green | Red |
| (too low) | (O.K) | (too High) |
- Corrections are made with switch (7)

Yellow = Turn switch clockwise
Red = Turn switch counterclockwise

CAUTION – If green light will not come on, call medical maintenance personnel – DO NOT operate apparatus.
(See Maintenance page 41).

7. Select an exposure time of 3.2 seconds by turning knob (9) to align adult symbol (orange line) with 3.2 on scale.

Do not depress knob when aligning adult/child symbols.

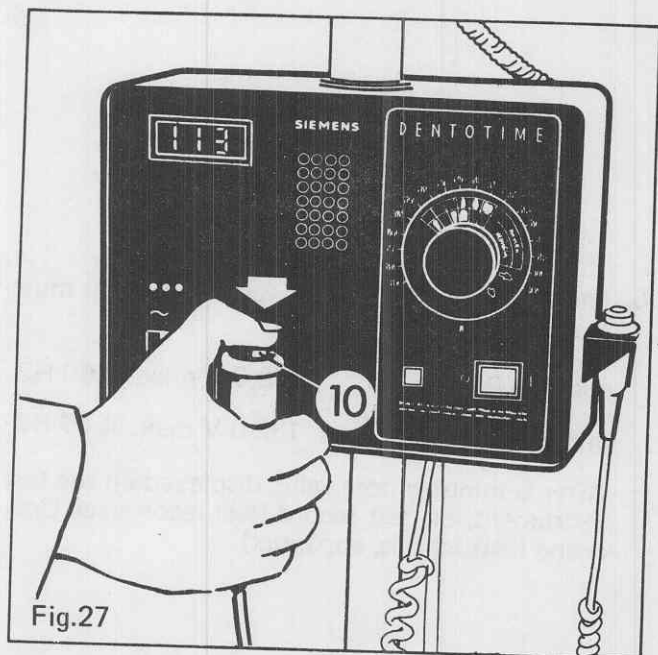


Fig.27

Value from step 5

Step 8

_____ V minus

_____ V equals

_____ V

No load

Load

Voltage drop

Remove lead CAP from collimator cone and store in case.

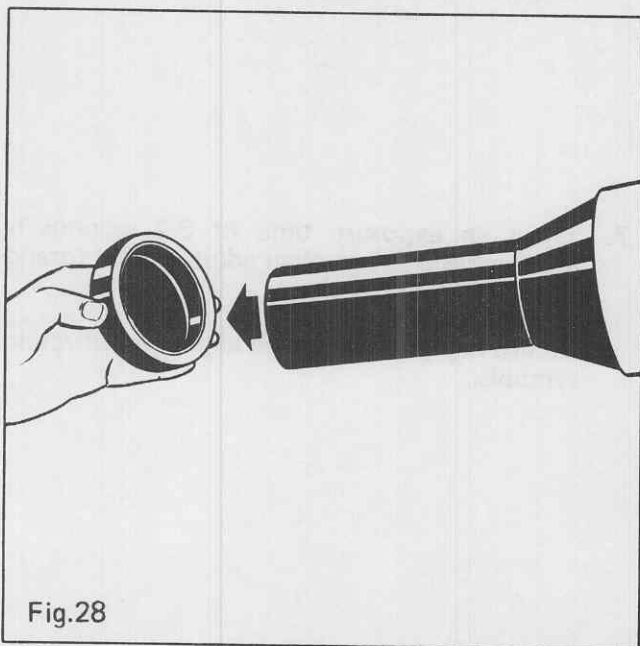


Fig.28

Caution radiation:



8. With the exposure button (10) take a position of at least 6 feet away from the X-ray head with the digital display of the power supply test instrument still legible.

Make an Exposure



Note value displayed on the instrument during exposure on test record.

Attention:

During exposure the yellow LED may come on. This is a normal condition if the line voltage regulation exceeds 3V.

9. To calculate the power supply adequacy enter the displayed values of the test instrument:

The maximum permissible voltage drop must not exceed 6 V over the entire operating range. !

In the event the calculated voltage drop is higher than stated above, another power supply must be located on the premises until the test results are met as specified.

WARNING

Failure to comply with these requirements may result in a non-compliance of "the federal performance standard of diagnostic X-ray units" subsequently, punitive action (fines) may be levied against the operator by the Bureau of Radiological Health (BRH).

In the interest of the public health and safety and for the operators protection the power supply adequacy "Test record" (see attached sample) must be filled out and signed by the operator in charge, each and every time the portary is set-up in a new location.

The test record must remain with the equipment for possible inspection by radiation health officers.

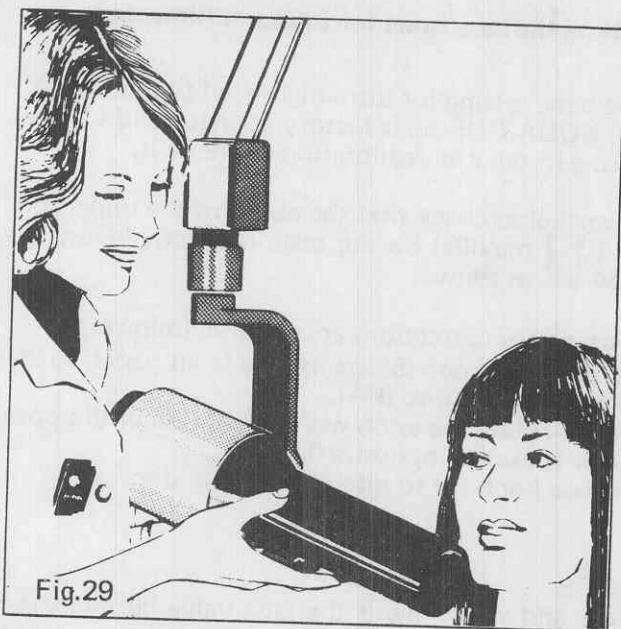


Fig.29

OPERATION

Preparation for exposure

Seat the patient, adjust the HELIODENT 70 to the patient.
(We recommend the use of a lead apron for the patient as added protection).

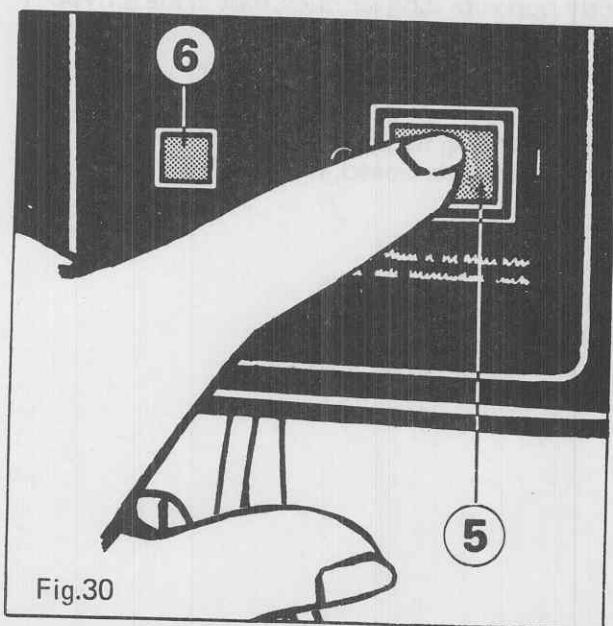


Fig.30

Switch on the unit

With switch (5) Power-on-switch lights up (Green)

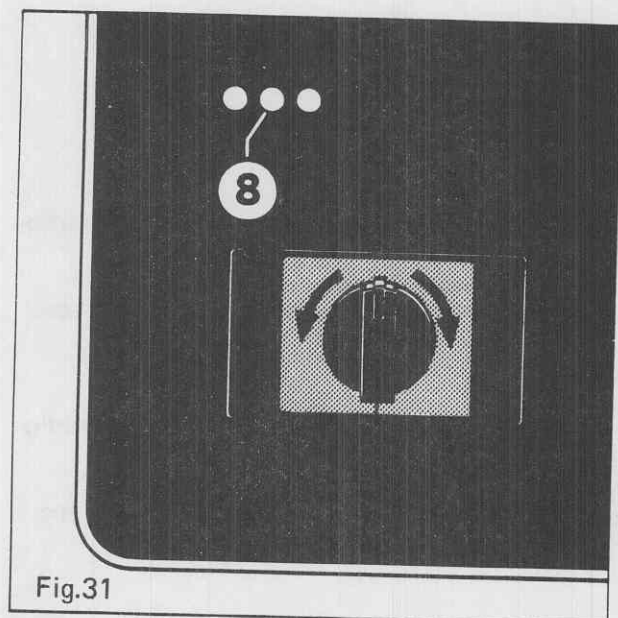


Fig.31

Check if the green lightdiode (8) is lit, proper line voltage exists.
Your HELIODENT 70 is ready for operation.

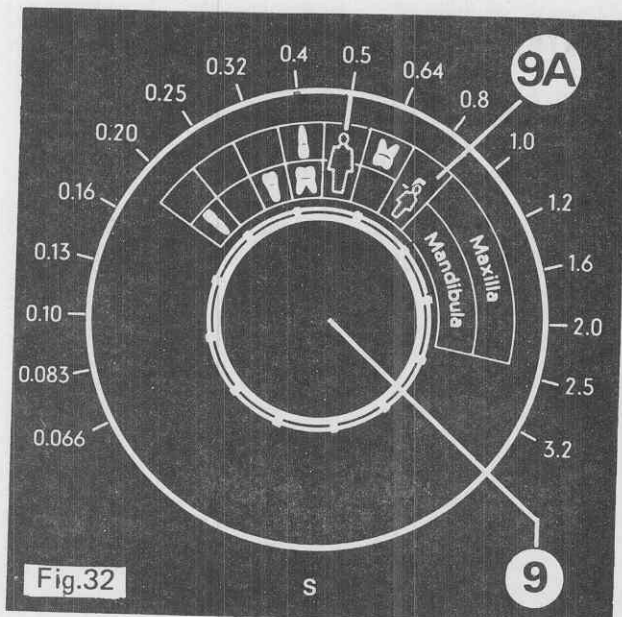


Fig.32

Setting the base value for intraoral filmspeed

The basic setting for ultra-highspeed film class "D" e.g. KODAK DF 58 is factory adjusted and verified during installation/calibration of the unit.

Nevertheless check that the object of the upper molar (E maxilla) on the scale is exactly below the 0,64 sec. as shown.

If necessary corrections are made as follows:

- Gently press knob (9) against the front panel, to engage the object disc (9A).
- Slowly rotate the knob with object disc until upper molar is exactly opposite 0,64 sec.
- Release knob (9) to disengage object disc.

NOTE:

Now and only now is the base value correctly set for ultra-highspeed film "D". If upper molar is not exactly opposite 0.64 seconds, base value is INCORRECT.

NOTE:

The basic setting for ultra-highspeed film class "E", e.g. KODAK Ekta Speed, must be 0,32 sec.

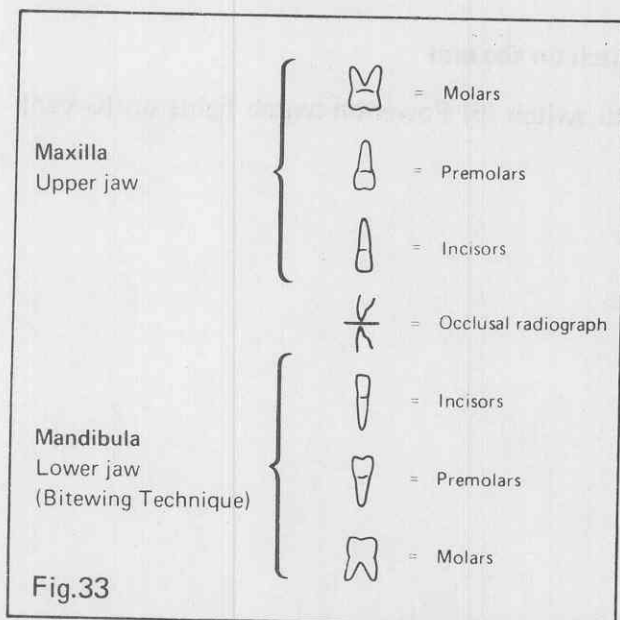


Fig.33

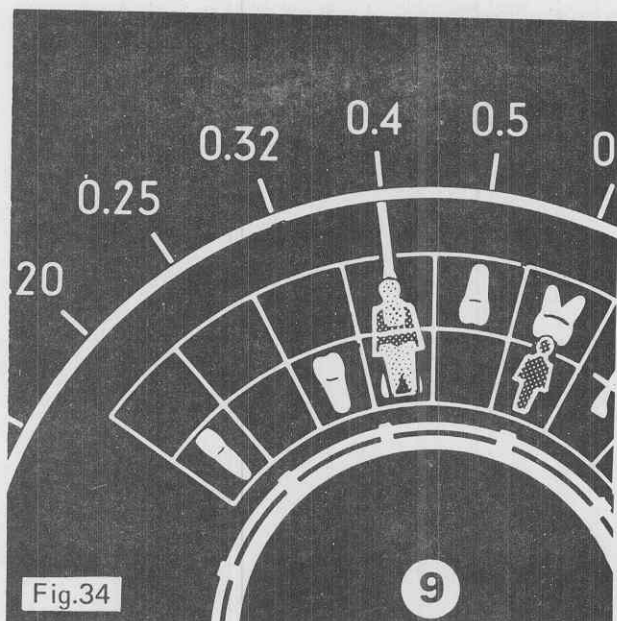


Fig.34

Selection of the exposure

Adult patient



Turn knob 9 to align figure with tooth to be radiographed as shown

(Cuspid — Lower Molar)

Exposure time indicated by orange line is 0,4 sec.

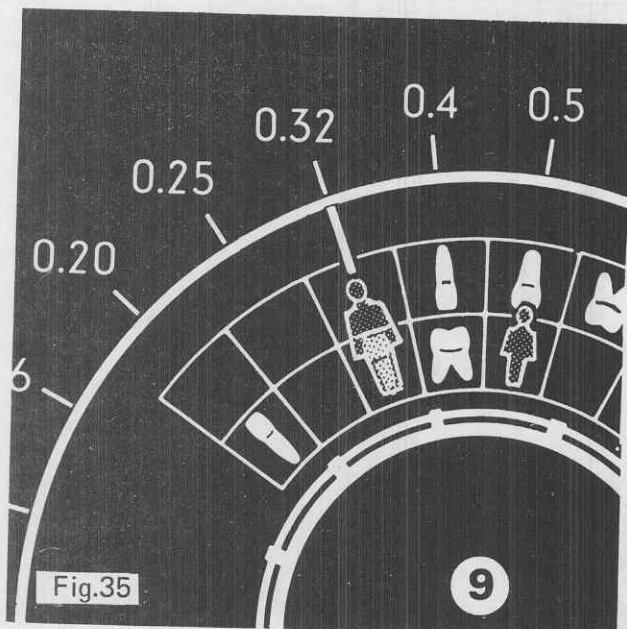
Child patient



Turn knob 9 to align figure with tooth to be radiographed as shown

(Upper Molar)

Exposure time indicated by orange line is 0,4 sec.



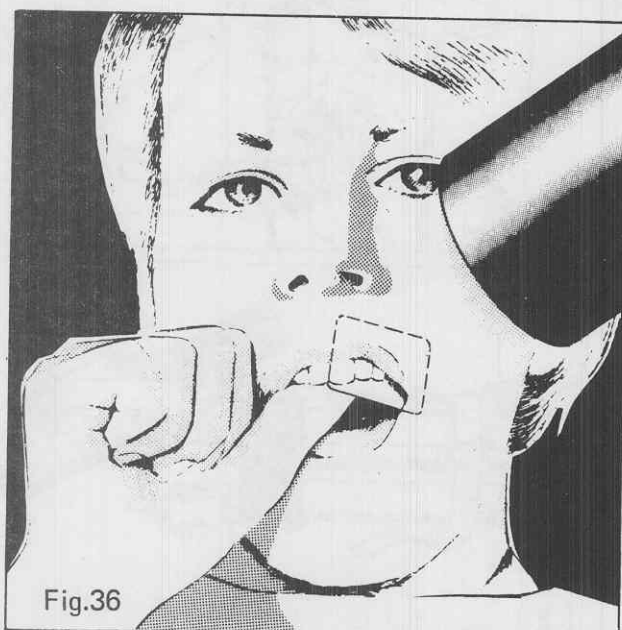
Bitewing Technique

For bitewing exposure use mandibula teeth only as shown.

Example:

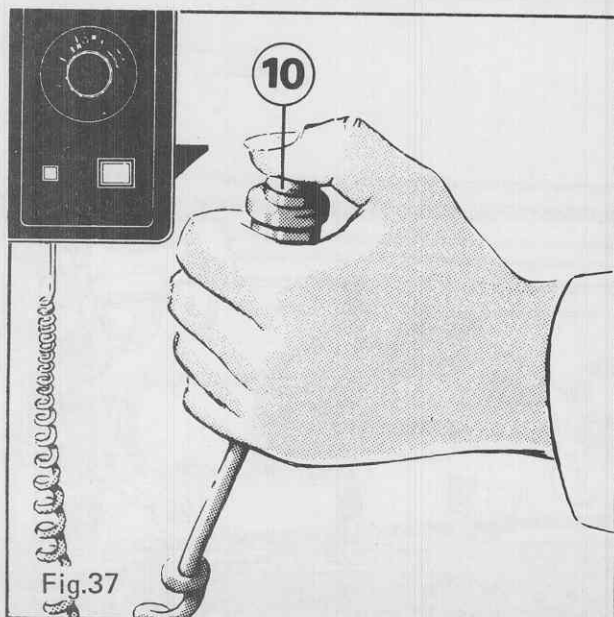
Adult — Pre-Molar (Mandible)

Exposure time indicated by orange line is 0,32 sec.



Insertion of the film

Insert the film in the patient's mouth. The film is held by the patient or a filmclip may be used.



Releasing the exposure



Depress the button on the handswitch (10). Fully depress the button and hold until the exposure terminates automatically. The red pilot lights during the exposure period. Simultaneously audible sound is present.

IMPORTANT

If the button is released before the set exposure time is over, the exposure is terminated prematurely.

Repacking

Disconnect unit from power supply

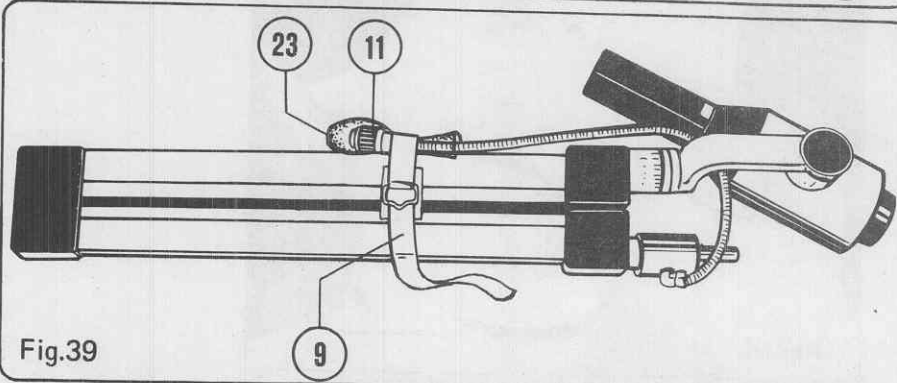
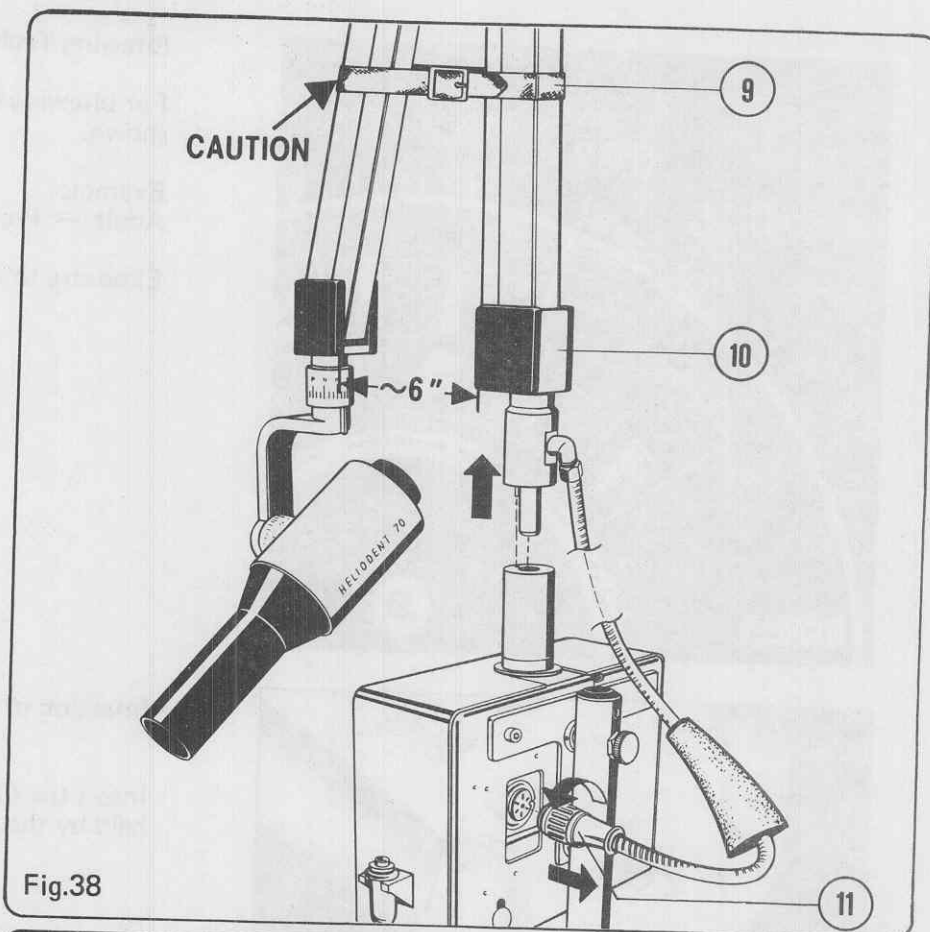
1

Remove X-Ray Arm assembly (10) first!!

Place safety strap over scissor arm as shown.

CAUTION! Failure to follow this procedure may cause injury, and/or damage to the scissor arm (the arm is spring loaded).

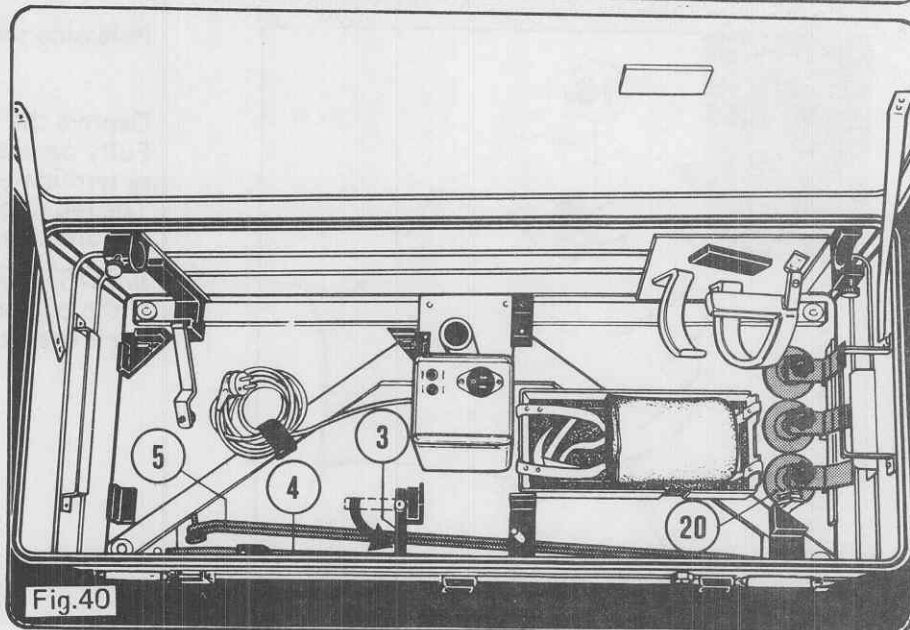
Loosen locking ring, disconnect multi pin connector, disengage scissor arm assembly from coupling as shown, place protective sleeve (23) over multi pin connector (11), route greenfield tubing tighten strap (9).

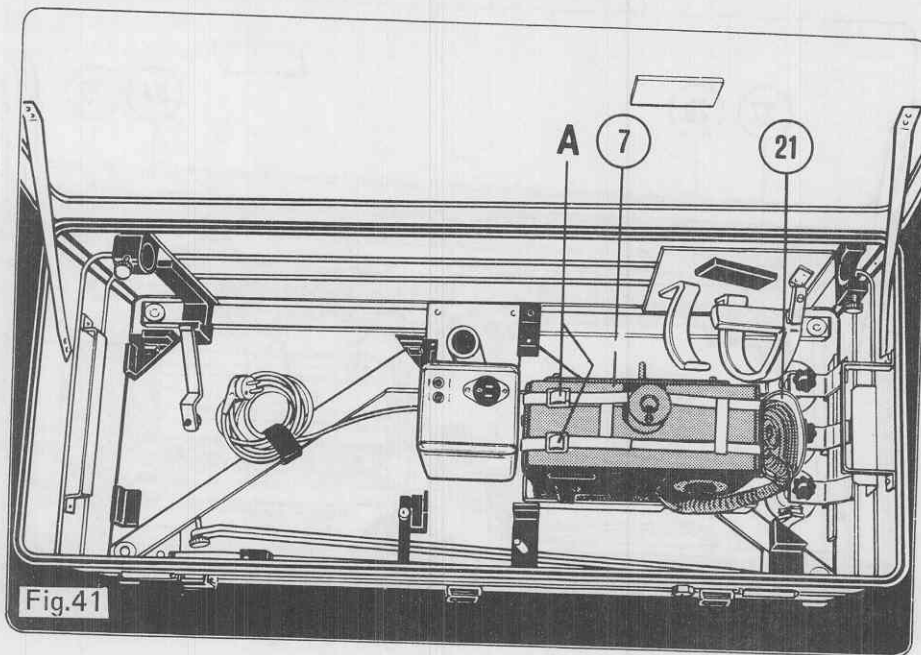


Remove all other components.

Fold support bars (4) and (5), secure with bracket (3) in the direction of arrow.

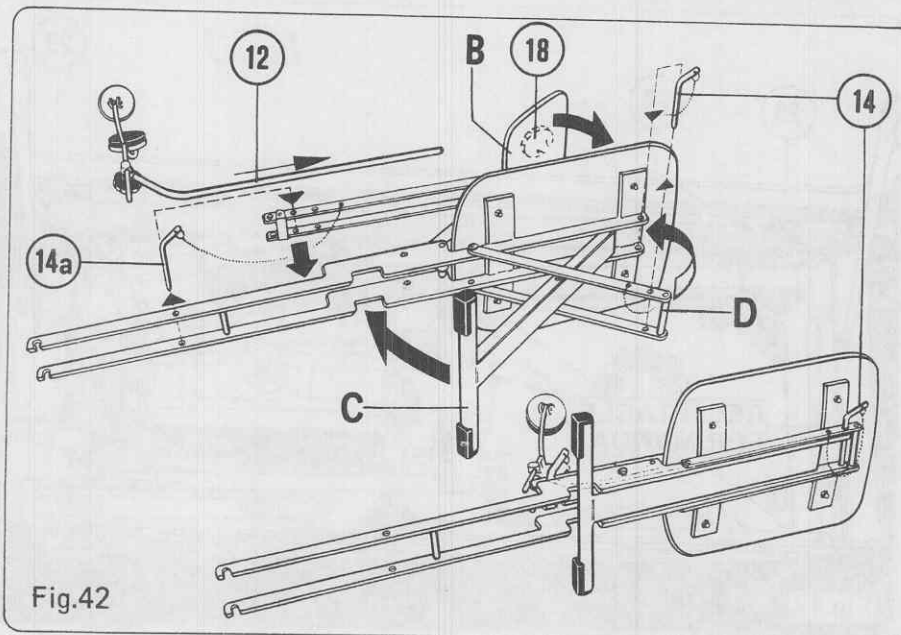
Store leveling brackets (20) as shown and secure.





2

Place X-Ray control (7) into cradle, store power cord and exposure cord in pouch (21) . Secure control as shown (A).

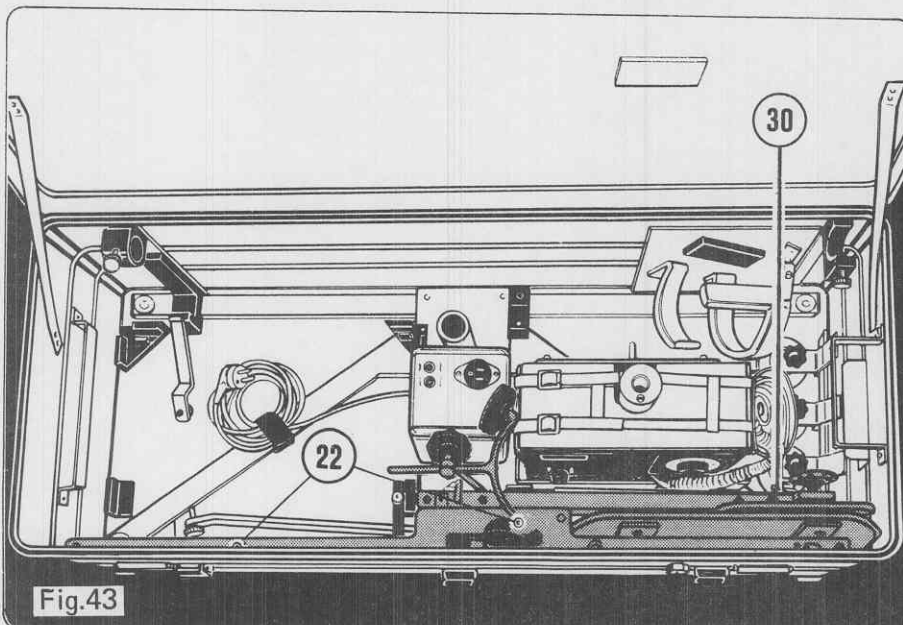


3

Remove headrest assembly (12). Remove pin (14a) and store in backrest brace.

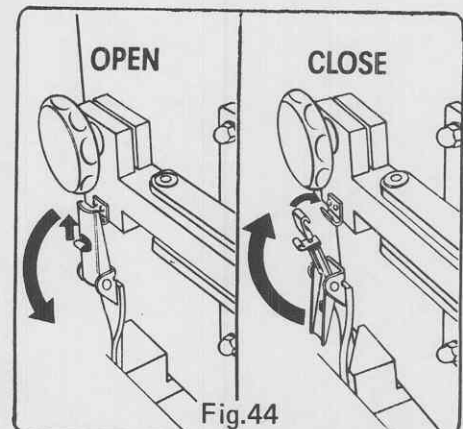
Fold backrest (B). Insert headrest assembly (12) in the direction of arrow, secure with knob (18).

Remove safety pin (14) , fold stool leg (C) and retainer bracket (D), secure with safety pin as shown.



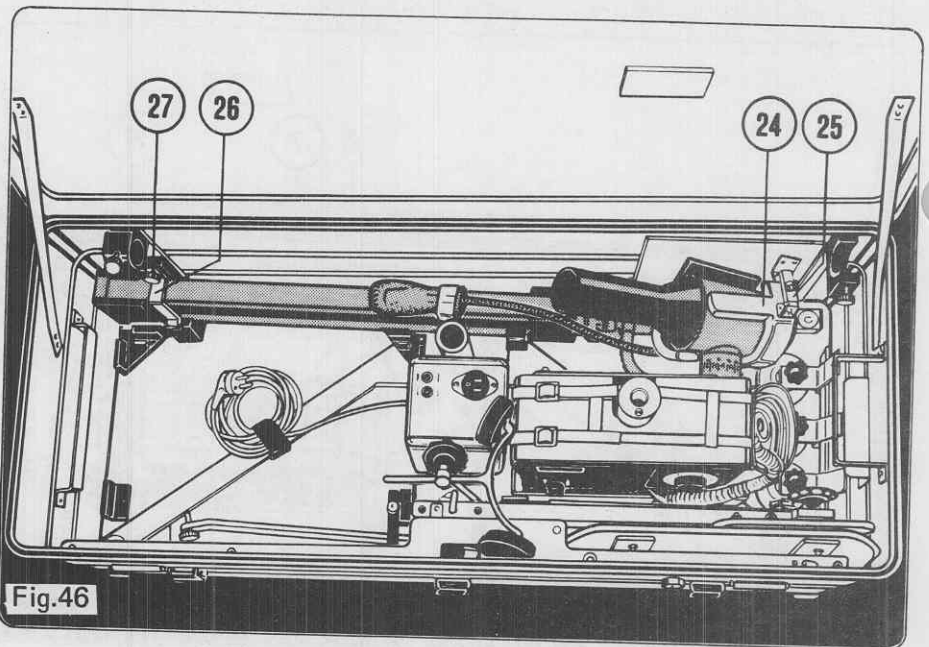
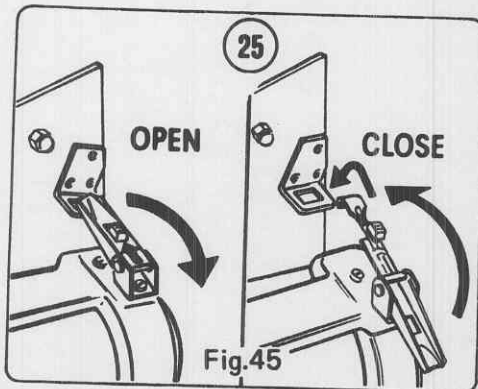
4

Place stool assembly into case, watch for dowel pins (22) to engage as shown. Secure (CLOSE) with fastener (30).



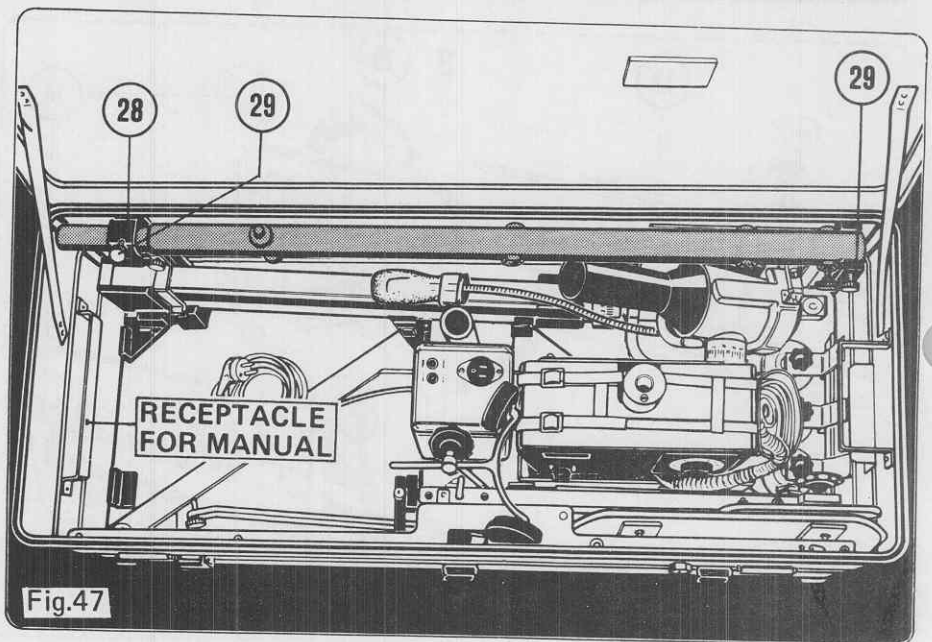
5

Raise brackets (24) and (26) OPEN, place scissor arm with X-Ray head into cradle. Secure brackets with fasteners (25) and (27) CLOSE.



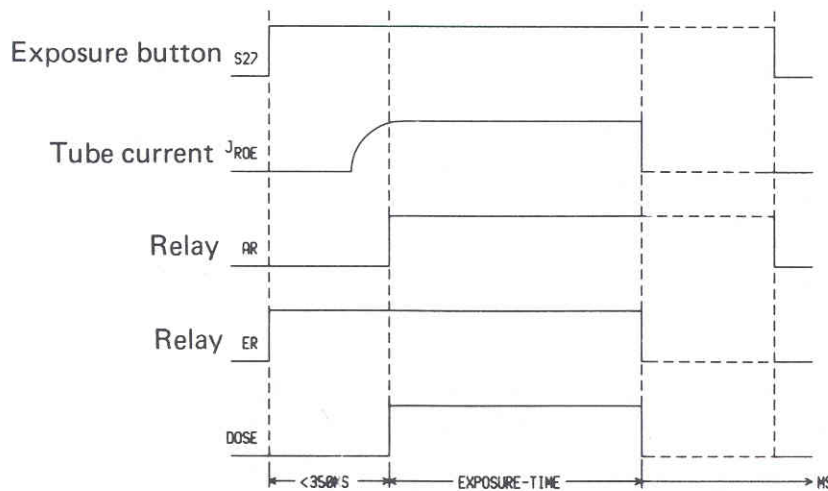
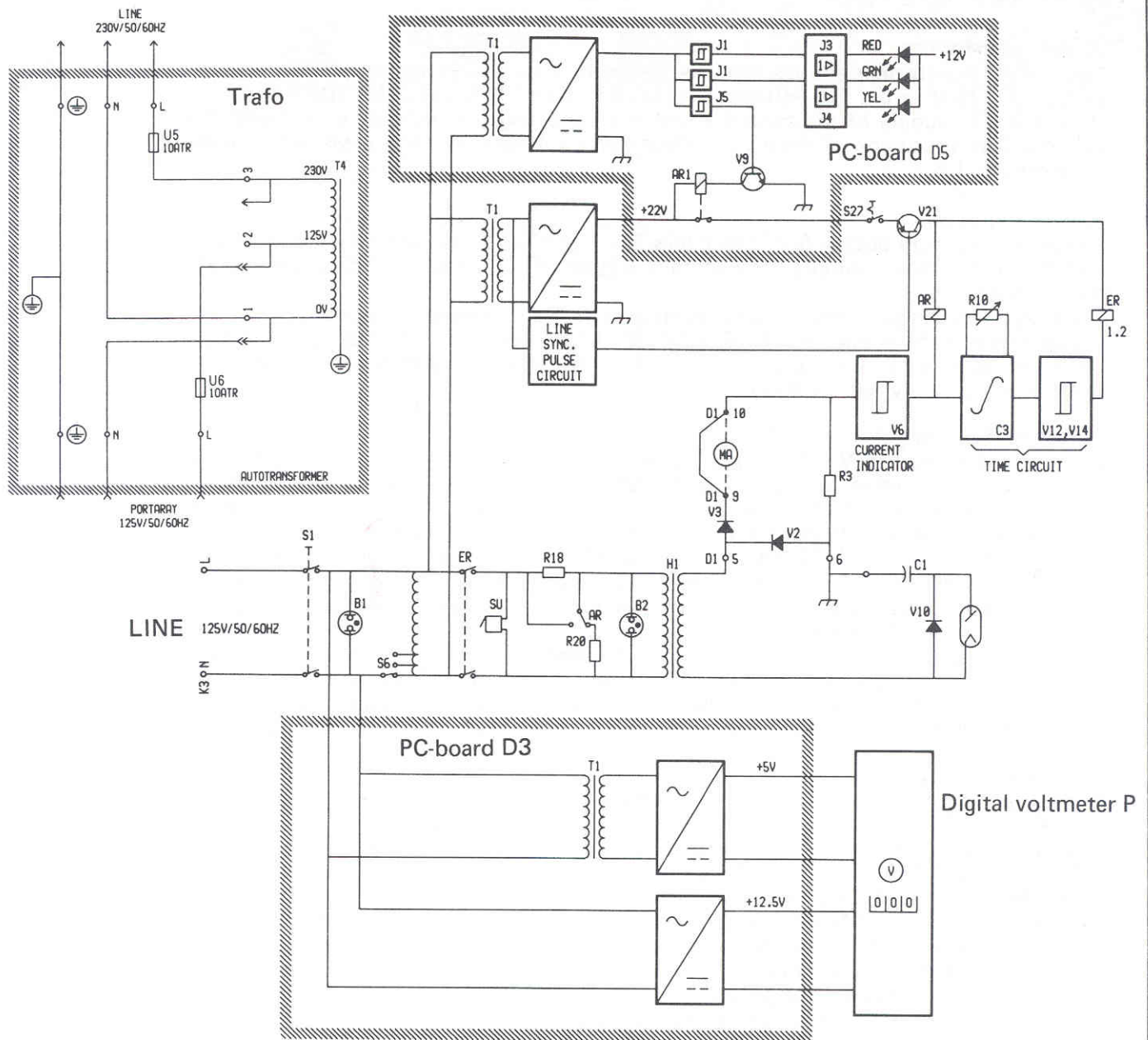
6

Guide upright (28) through grommet (29) as shown, secure both ends to the case with two knurled knobs (29).



THEORY OR PRINCIPLES OF OPERATION.

Logic block diagram



DESCRIPTION OF FUNCTION

Line input

The line input is protected with the fuses U 2 and U 3. The readiness indicating B 1 lamp lights if the switch S 1 is on.

Control transformer

The control transformer ensures that the Heliodent 70 is always operated with a primary voltage of 125 V in the line voltage range of 109 V to 133 V at 60 HZ, 109 V to 132 V at 50 HZ. The supply of the control transformer is changed to such an extent with the switch S 6 as a function of the input voltage that a voltage of 125 V is measured between the terminals T 3.1 - 7.

Start of Exposure

Depressing exposure button S 27 the relays ER 1 and ER 2 are controlled via V 21 synchronized to the power supply. The schmitt trigger (V 12, V 14) switches and the ER relay energizes.

The relay contacts place the primary winding of the high-voltage transformer H 1 under voltage through the voltage divider R 18/R 20. At the same time the buzzer SU and the radiation indicator B 2 are caused to operate and indicate the duration of the X-ray radiation acoustically and optically.

Exposure (Current path)

The base of transistor V 19 is supplied with power supply synchronized positive half waves and a square wave collector output. This output is differentiated by C 8 and R 30. The positive peak controls the transistor V 20, diode V 23. The inverted peaks are collected at base V 21, when exposure button S 27 is depressed V 21 turns the timer on. The voltage via dividers R 31, R 32 controls V 20 and V 21 as long as S 27 is depressed.

Since the capacitor C 3 is not yet charged, the transistor V 12 is blocked. V 14 obtains base current through the resistor R 12/R 14, and is then switched through. As a result, the relays ER 1 and ER 2 energize.

The emitter current of V 14 flows through the potentiometer R 13 and causes a voltage drop in it. It is thus possible to adjust the threshold voltage of the Schmitt trigger consisting of V 12/V 14, the transistor V 12 can be controlled through only once its base voltage exceeds the value of $0.7 \text{ V} + \text{on R 13}$.

Switching relay AR

As soon as the tube current allows a voltage drop on the resistor R 3 which is greater than $U(V 4) = 2,4 \text{ V} + U(V 5) = 0,7 \text{ V} + U(V 6) = 0,7 \text{ V}$, the transistor V 6 is controlled through. Then, the transistor V 7 is also controlled through R 9. The collector current of V 7 allows the AR relay to draw. This relay places the Heliodent 70 transformer under a voltage of 125 without damping.

The collector current of V 7 flows, at the same time through V 8, R 8, R 5 to the base of V 6, and keeps V 6 in the overmodulated state (flip-flop function). The capacitor C 7 and C 2 serve for interference suppression.

The transistor V 7 also controls the transistor V 17. This transistor serves as an impedance converter and provides a supply voltage stabilized by V 18 to the integrator, consisting of R 10 and C 3. The exposure times of 0.066 to 3.2 sec. are set in 18 steps with R 10.

End of exposure

As soon as C 3 is charged to the threshold voltage, which is adjusted with R 13, the transistor V 12 switches through. This initiates a flip-flop process. On the one hand, the transistor V 12 short circuits the base section of V 14, so that the current through ER is reduced; on the other hand, the voltage drop on R 13 decreases, so that the transistor V 12 is controlled through even faster. Thus, the ER relays drop.

Temperature compensation

The R 11 hot wire compensates the temperature response of the entire circuit in the 10° to 70° C range.

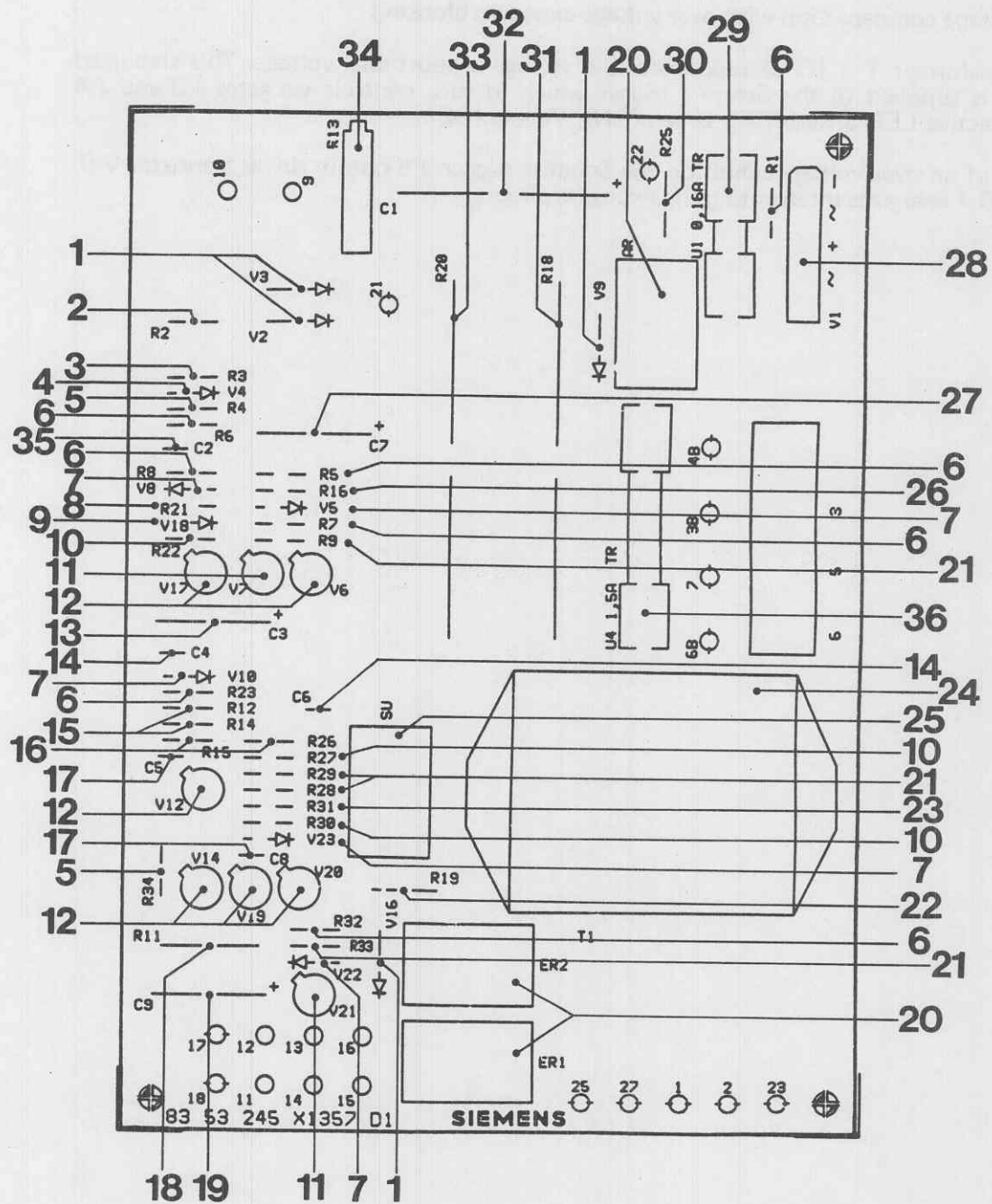
Forced exposure

In case of a defect where no tube current signal triggers the Dentotime there is a forced switching system. The capacitor C 7 is charged through the resistor R 16 after switching on.

If no tube current pulse triggers the Dentotime, the transistor V 6 is controlled through over R 16 after approximately 0,7 to 1 sec. and the timer circuit is actuated.

PC – board D1

1 SI-Diode EGB	V2, V3, V9, V16	1000 V 1A DO-41 1N 4007
2 Zinkoxid varistor EGB	R2	14 V 0,05W 069-X3011
3 Metal film resistor	R3	510 Ohm 0,25W 1 % Gr. 0207
4 SI-Z-Diode EGB	V4	BZX 97 C2V4 2,4 V 0,4W 5 % DO-35
5 Metal film resistor	R4, R34	470 Ohm 0,25W 1 % Gr. 0207
6 Carbon resistor	R1, R5, R6, R7, R8	10k 0,25W 5 % Gr. 0207
7 SI-Planar-Diode	V5, V8, V10	50 V 200 mA DO-35 BAW 76
8 Metal film resistor	R21	390 Ohm 0,25W 1 % Gr. 0207
9 SI-Z-Diode EGB	V18	ZPD12 12 V 0,4W 5 % DO-35
10 Metal film resistor	R22, R27, R30	100k 0,25W 1 % Gr. 0207
11 SI-PNP-Transistor EGB	V7, V21	BCY78 IX TO-18 32 V 200 mA
12 SI-NPN-Transistor EGB	V6, V12, V14, V17, V19, V20	BCY59 IX TO-18 45 V 200 mA
13 Capacitor	C3	22MF 16 V- 20 % 0513
14 Ceramic Capacitor	C4, C6	100NF 100 V 10 % W5R 8x8x4-2M
15 Metal film resistor	R12, R14	2,2k 0,25W 1 % Gr. 0207
16 Metal film resistor	R15, R26	22k 0,25W 1 % Gr. 0207
17 Ceramic Capacitor	C5, C8	22NF 100 V 10 % W5R 7x5x4-2M
18 Measuring resistor	R11	2k 5 % 0,1W K11
19 Capacitor	C9	2,2MF 35 V- 20 % 0408
20 Relay N	AR, ER1, ER2	12 V- 1U V23016
21 Metal film resistor	R9, R28, R29, R33	5,6k 0,25W 1 % Gr. 0207
22 Metal film resistor	R19	5,6k 0,5W 1 % Gr. 0309
23 Metal film resistor	R31	1k 0,25W 1 % Gr. 0207
24 Transformer	T1	125/17,5 V 3VA Typ 42
25 Relay N	SU	60 V- 1U V23016 LO
26 Resistor	R16	5,6M 0,25W 1 % Gr. 0207
27 Capacitor	C7	4,7MF 35 V- 20 % 0513 Dry
28 SI-Rectifier set EGB	V1	B 80 V 1A
29 Fuse	U1	0,16A 250 V slow blow 5x20 mm
30 Metal film resistor	R25	12k 0,5W 1 % Gr. 0309
31 Wire wound resistor	R18	6,8 Ohm 10W 5 % Gr. 1045
32 Elko/Capacitor	C1	1MF 40 V- +50 -10 % Gr. 17x31
33 Wire wound resistor	R20	82 Ohm 10W 5 % Gr. 1045
34 Resistor spindel Adj.	R13	100 Ohm 0,75W 10 %
35 Ceramic Capacitor	C2	330NF 100 V 10 % W5R 8x8x4-2M
36 Fuse	U4	1,5A 250 V slow blow 1/4x1 1/4"



Digital Voltmeter "P" PC board D3

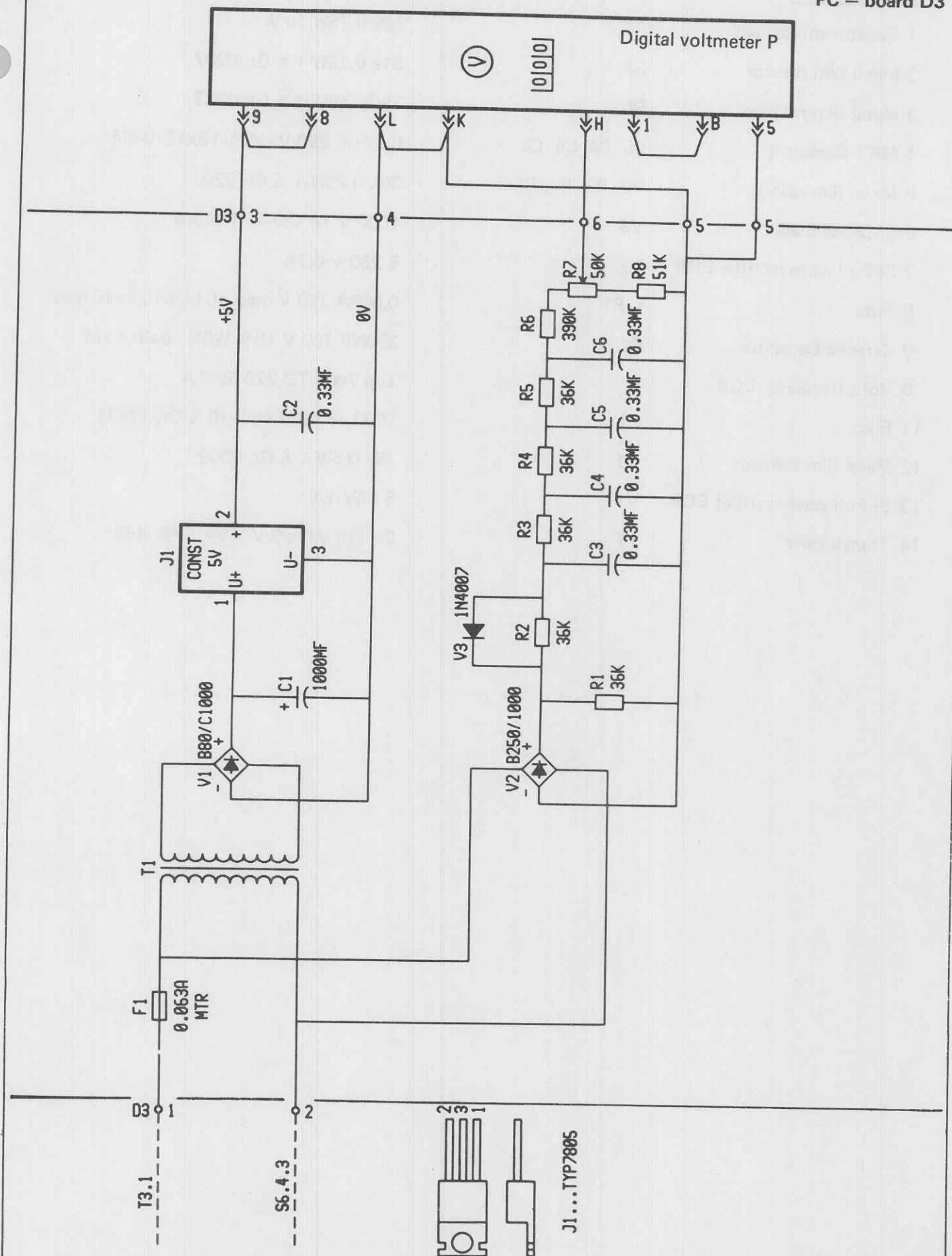
Principle

The digital instrument "P" receives a rectified filtered 12.5 V measuring voltage, proportional to a 125 V line voltage input. The power supply to the instrument consists of the transformer T 1 (D 3) and a 5 VDC circuit.

Line voltage compensation with over voltage exposure blocking

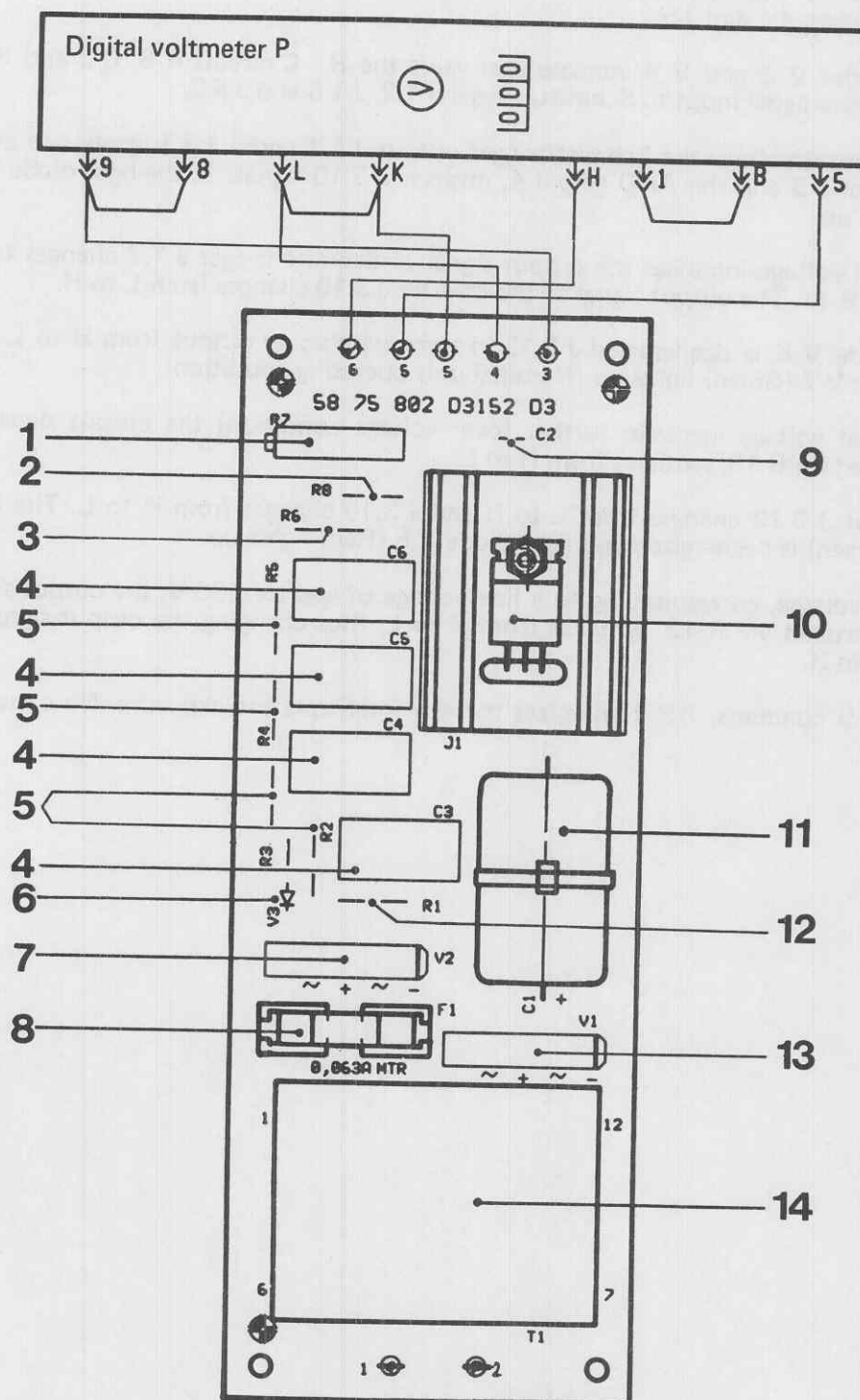
The transformer T 1 (D 5) supplies a line voltage proportional voltage. This stabilized voltage is supplied to the Schmitt trigger which in turn controls via gates J 3 and J 4 the respective LED'S Red (RT), Green (GN), Yellow (GE).

In case of an over voltage condition the Schmitt trigger J 5 output drives transistor V 9, relay AR 1 energizes interrupting the exposure circuit.



PC — board D3

1 Resistor spindel Adj.	R7	50k 0,75W 10 %
2 Metal film resistor	R8	51k 0,25W 1 % Gr. 0207
3 Metal film resistor	R6	390k 0,5W 1 % Gr. 0309
4 MKT-Capacitor	C3, C4, C5, C6	0,33 uF 250 V -20 % 18x15x9-6M
5 Metal film resistor	R2, R3, R4, R5	36k 0,25W 1 % Gr. 0207
6 SI-Diode EGB	V3	1000 V 1A DO-41 1N4007
7 SI-Full wave rectifier EGB	V2	B 250 V 0,7A
8 Fuse	f. F1	0,063A 250 V med. sl. bl. S10 5x10 mm
9 Ceramic Capacitor	C2	330NF 100 V 10 % W5R 8x8x4-2M
10 Volt. Regulator EGB	I1	Typ 7805 TO-220 5V/1A
11 Elko	C1	1000 uF 40 V +50 -10 % Gr. 17x31
12 Metal film resistor	R1	36k 0,5W 1 % Gr. 0309
13 SI-Full wave rectifier EGB	V1	B 80V 1A
14 Transformer	T1	2x 115 V/2x 6 V 4VA TFB 468



Linevoltage indication and over voltage exposure interruption PC board D5

The 15 V stabilizer J 2 receives its input voltage from the power supply of the timing switch board D 1. The transformer T 1 (D 5) supplies via rectifier V 1 the voltage for the Schmitt triggers J 1 and J 5.

The zener diodes V 3 and V 4 increase that value the R - C circuit R 8, C 3 and R 5, C 4 smoothen the signal input to Schmitt, trigger J 1.2, J 1.6 and J 5.2.

At a lower control voltage the Schmitt trigger output J 1.1 and J 1.7 (signals) are at H. Via the inverter J 3 and the AND gate J 4, inverter J 3.10 signals L, the light diode V 6 (yellow) lights up.

As the control voltage increases the output signal of Schmitt trigger J 1.7 changes to L, controlled by R 11. The output signal of the inverter J 3.10 changes from L to H.

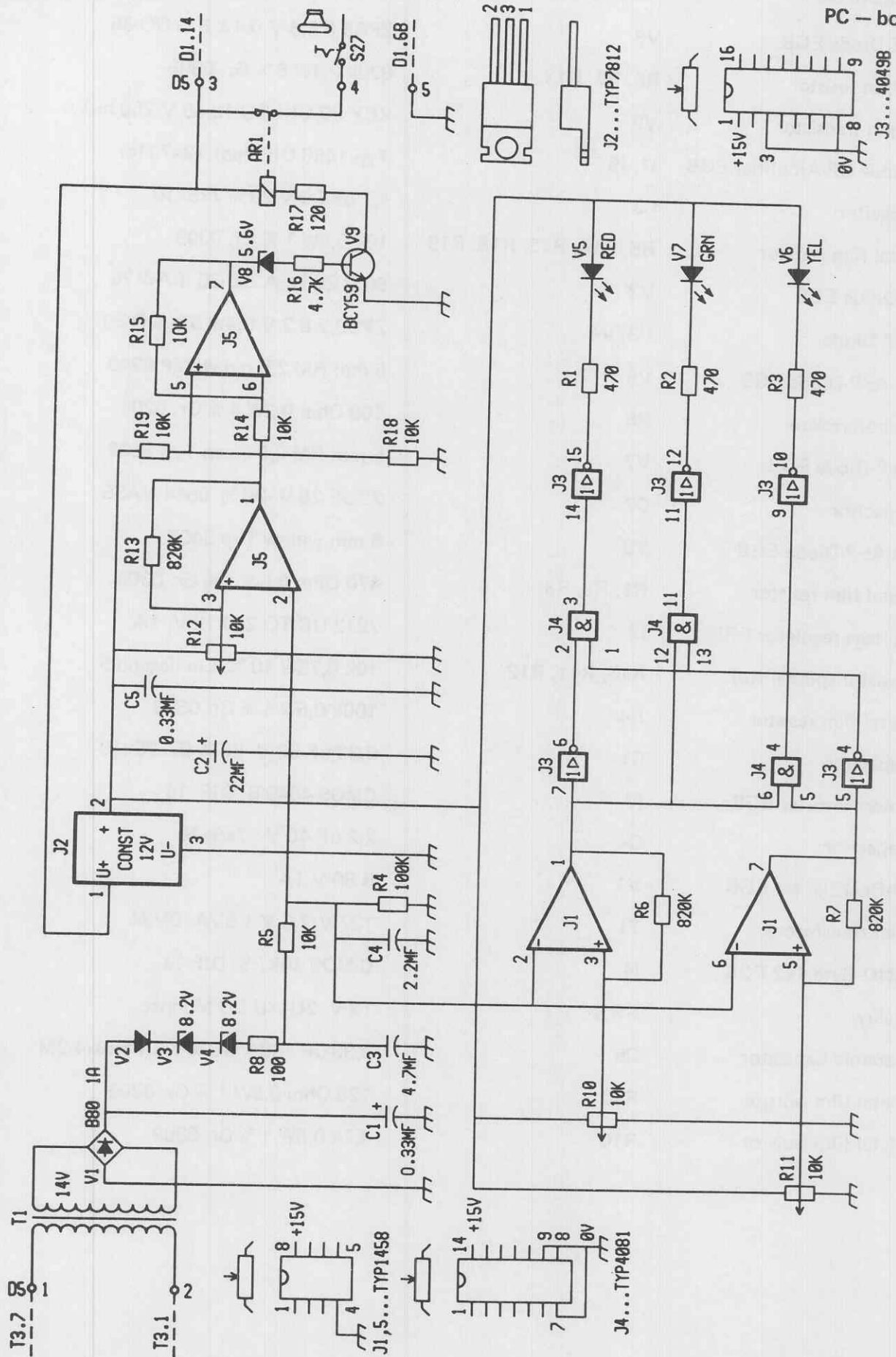
The light diode V 6 is deenergized J 3.12 in turn switches to output from H to L and the light diode V 7 (Green) lights up (Nominal unit operating condition).

As the control voltage increases further (over voltage condition) the output signal of J 1.1 controlled via R 10, switches from H to L.

The output of J 3.12 changes from L to H and J 3.15 changes from H to L. The light diode V 7 (Green) is deenergized and light diode V 5 (Red) lights up.

At a control voltage, corresponding to a line voltage of approx. 130 V, the output signal of J 5.1 controlled via R 12, switches from H to L, thus changing the output signal of J 5.7 from L to H.

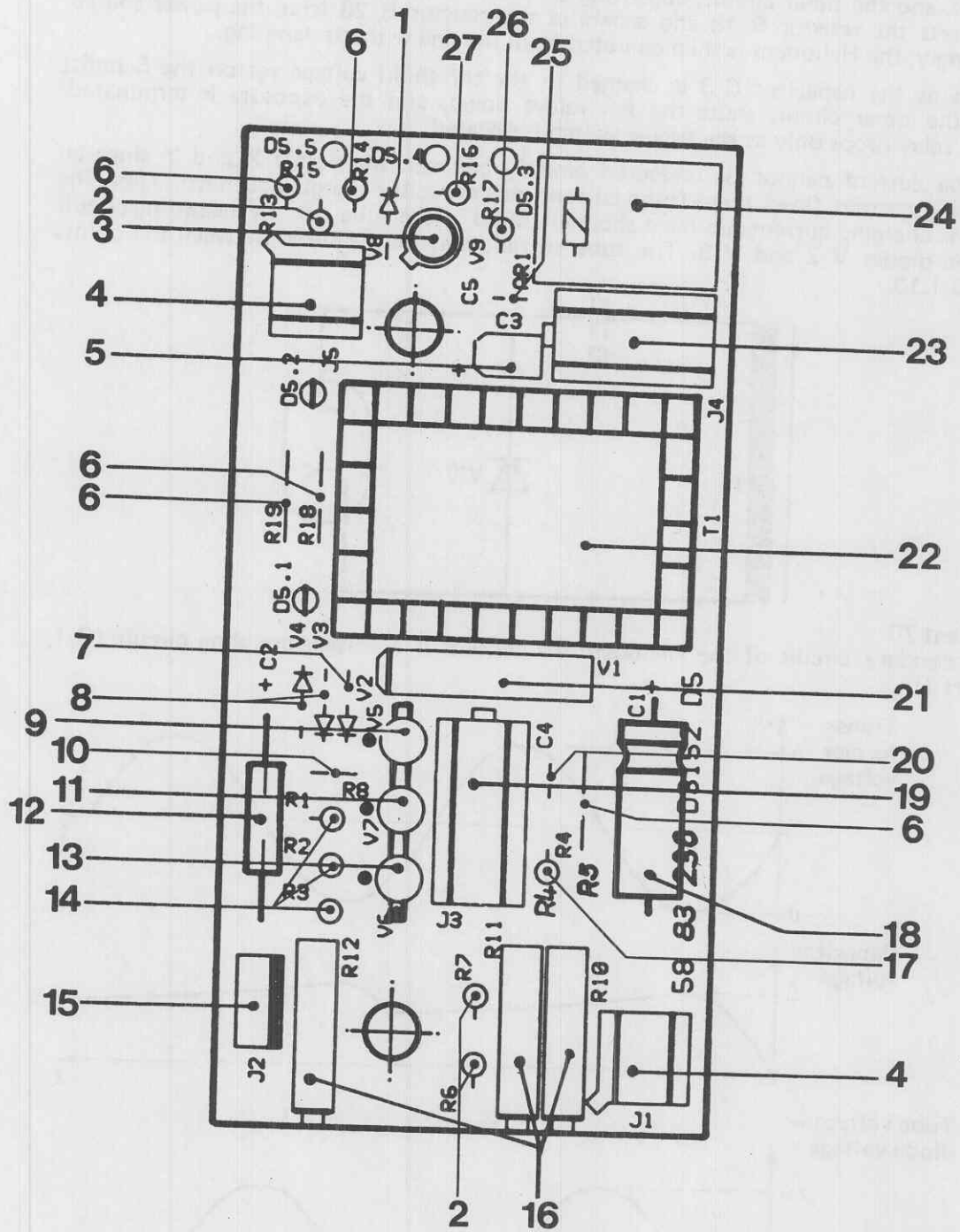
Transistor V 9 conducts, AR 1 energizes thereby interrupts the exposure. No exposure can be made.



PC — board D5

PC — board D5

1 SI-Z-Diode EGB	V8	ZPD5,6 5,6 V 0,4W 5 % DO-35
2 Carbon resistor	R6, R7, R13	820k 0,4W 5 % Gr. 0309
3 SI-npn-transistor	V9	BCY 59 VIII TO-18 45 V 200 mA
4 Double-OP-Amplifier EGB	I1, I5	Typ 1458 DIP 8pol. (2x741c)
5 Capacitor	C3	4,7 uF 35 V 20 % 7x5x10
6 Metal film resistor	R5, R14, R15, R18, R19	10k 0,5W 1 % Gr. 0309
7 SI-Diode EGB	V2	50 V 200 mA DO-35 BAW 76
8 SI-Z-Diode	V3, V4	ZPD8,2 8,2 V 0,4W 5 % DO-35
9 Ga-As-P-Diode EGB	V5	5 mm RM 2,5 red HLMP 0240
10 Carbon resistor	R8	100 Ohm 0,2W 5 % Gr. 0204
11 Ga-P-Diode EGB	V7	5 mm RM 2,5 green Typ 3502
12 Capacitor	C2	22 uF 25 V -20 % 0614 NASS
13 Ga-As-P-Diode EGB	V6	5 mm yellow Typ 3400
14 Metal film resistor	R1, R2, R3	470 Ohm 0,5W 1 % Gr. 0309
15 Voltage regulator EGB	I2	7812 UC TO-220 12 V, 1A
16 Resistor spindel Adj.	R10, R11, R12	10k 0,75W 10 % Lin liegend S
17 Metal film resistor	R4	100k 0,5W 1 % Gr. 0309
18 Capacitor	C1	0,33 uF 63 V -20 % Gr. 06x19
19 Power inverter EGB	I3	CMOS 4049 B DIP 16
20 Capacitor	C4	2,2 uF 40 V- 7x5x10
21 SI-Rectifier set EGB	V1	B 80 V 1A
22 Flat transformer	T1	127 V/9,5 V 1,8VA BV34
23 AND-Gate 4x2 EGB	I4	C MOS 4081 B DIP 14
24 Relay	AR 1	12 V -2U AU LO Monost.
25 Ceramic-Capacitor	C5	0,33 uF 100 V 10 % W5R 8x8x4-2M
26 Metal film resistor	R17	120 Ohm 0,5W 1 % Gr. 0309
27 Metal film resistor	R16	4,7k 0,5W 1 % Gr. 0309



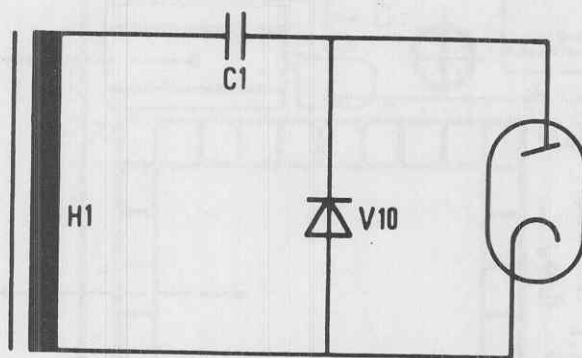
PORTARAY Heliodent 70 Dentotime

Description of function

The X-ray tube of the Heliodent 70 is indirectly heated, i. e., the heater and the high voltage are switched on at the same time. Thus, tube current flows only once the emission temperature of the filament is reached (after 150 to 250 msec). As soon as the peak tube current exceeds a given value, the Schmitt trigger (V 6) switches over, the AR relay energizes, and the timer circuit, consisting of C 3/R 10, V 12, V 14 is triggered. The AR relay shorts the resistor R 18 and separates the resistor R 20 from the power source. Accordingly, the Heliodent is then operated from the line without damping.

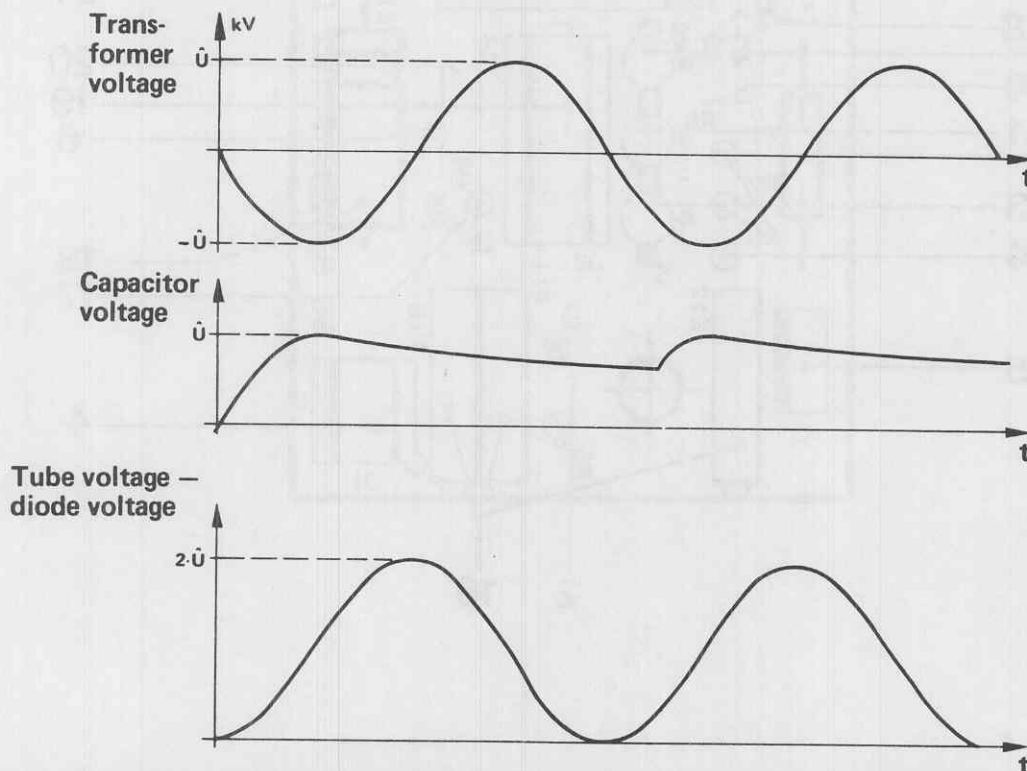
As soon as the capacitor C 3 is charged to the threshold voltage set on the Schmitt trigger the timer circuit shuts the ER relays down, and the exposure is terminated. The AR relay drops only as the trigger switch is released.

The tube current cannot be measured directly between the points X and Y since an alternating current flows there (tube current plus capacitor-charging current). Thus, the capacitor charging current has been short circuited in the tube current measuring circuit with the diodes V 2 and V 3. The tube current may be measured between the points D 1.9/D 1.10.



Heliodent 70

The secondary circuit of the Heliodent 70 consists of a voltage-doubling circuit (C 1, V 10, H 1).



The negative half wave of the transformer voltage charges the capacitor C 1. The positive half wave of the transformer voltage is added to the capacitor voltage, so that twice the transformer peak voltage is measured on the tube.

MAINTENANCE

To stay in compliance with the DHHS requirements the PORTARAY must be maintained annually. It is the responsibility of the user to insure that the equipment is maintained with the manufacturer's recommended maintenance schedule to insure compliance with the Federal Performance Standard. The manufacturer and the assembler/installed are relieved from responsibility in those cases where noncompliance with the standard results from the user's failure to have the manufacturer's recommended maintenance performed..

The actual maintenance inspection and consequent service must be accomplished by a trained serviceman. Neither the inspection nor service is part of the equipment warranty.

Instruments required:

Digital Multimeter MODEL — FLUKE 8000 A, or equivalent.

Accuracy:

AC voltage $\pm 0.5\%$ of reading plus 1 digit
DC voltage $\pm 0.1\%$ of reading plus 2 digits
DC current $\pm 0.3\%$ of reading plus 1 digit

Electromechanical pulse counter
MODEL- KESSLER ELLIS KT 203 ± 1 pulse, or equivalent.

Regulating transformer (stepless) 90 — 150 VAC, 50 VA

Check as follows:

1. Verify that all labels are affixed and legible (labels see page 13)
Look for mechanical damage, possibly affecting radiation safety, (inspect collimator for possible cracks, test the tubehead in all working positions for possible drift).
2. Operating LED light (yellow, green, red) for line compensation must light up Digital line adequacy voltmeter must be operational.

Corrective Action:

Defaced labels must be replaced.

Order same from SIEMENS MEDICAL SYSTEMS, INC. Dental X-Ray Division (address see rear) in writing stating:

Customer Name
Customer Address
All Model Numbers with Serial Numbers still legible on the unit for identification purposes.

Should mechanical damage affecting radiation safety be evident, the user is not permitted to use the unit until repairs or replacements correcting the defect are made.

Defective bulbs for power "on" light, radiation indicating light, inoperative line compensation LED.s, Digital line adequacy voltmeter constitute a safety hazard to the patients well as to the operator, therefore, repairs or replacements must be made promptly, same rule as above applies.

WARNING! Radiation Safety

CAUTION: Radiation will be indicated by this symbol



To reduce personal exposure and not damage the X-ray tube head, the individual exposure times shall be just long enough to permit meter readings.

Observe radiation protection as outlined in on page 12.

3. Check radiation warning light and acoustic buzzer for proper functioning,
4. Make sure the X-ray exposure is interrupted after releasing the exposure switch (dead man feature).

Electrical Measurement / Calibration

Checking the line voltage
(Power supply)

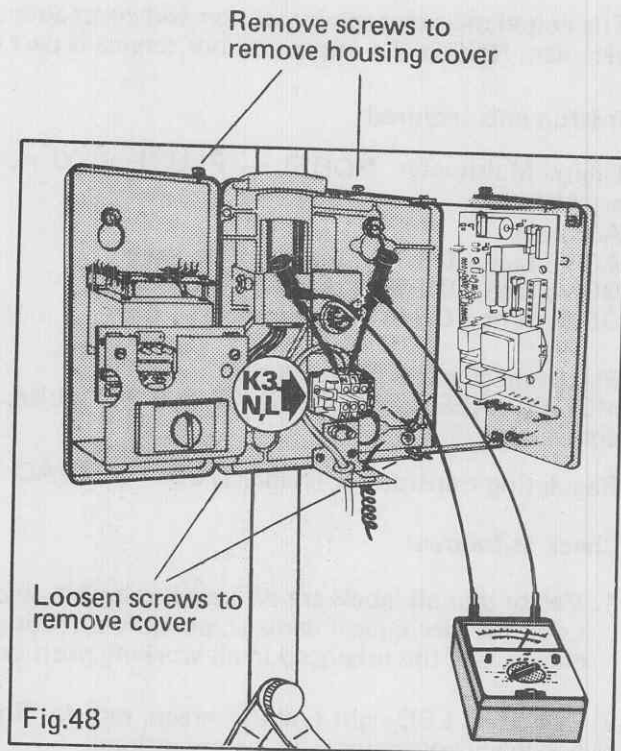
Remove cover **.CAUTION WIRES!**

Set the multimeter to a.c. voltage (range: 150V, a.c.). Connect the test leads to the terminals K3 N,L.

Turn on the power supply, note the measured value.

The measured line voltage must be at least 109V, A.C., and may not exceed 133 V, a.c.

* Line voltage range at 50 HZ ONLY 132 V

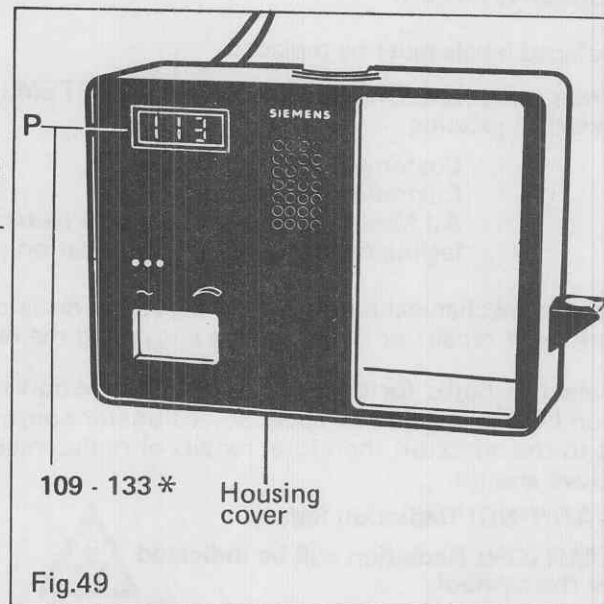


Digital line adequacy test instrument "P" (plus, minus 1 digit accuracy).

Plug in power supply.

Turn on the X-Ray control, wait 5 min (warm-up-time).

Compare the indicated value on the multimeter with the digital line adequacy test instrument. The values indicated must be within your multimeters stated accuracy tolerance.



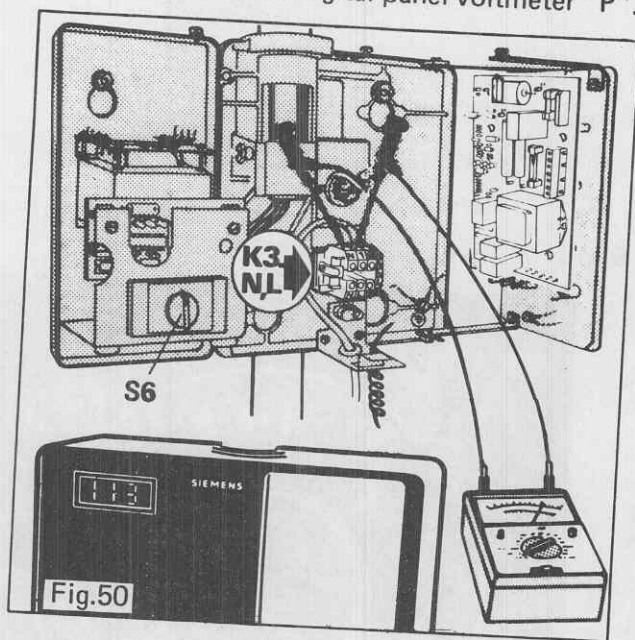
WARNING:

Electric shock hazard!

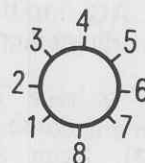
For reasons of safety, always disconnect the powercord while the measuring leads are connected to the various test points during the calibration.

Verification of the line voltage compensation light diodes (LED) function.

Determine that the power supply is within the specified range of 109 VAC to 133 VAC max. indicated on the digital panel voltmeter "P". Line voltage range at 50 HZ ONLY 132 V



S6 Positions



Dependent on the line voltage indicated and position of line compensation switch S6, the corresponding LED's Yellow, Green or Red light up.

On hand of Chart A compare:

Digital instrument "P"	POSITION							
	1	2	3	4	5	6	7	8
109 V	GE						GE	GN
110 V	GE						GE	GN
111 V	GE						GE	GN
112 V	GE					GE	GE/GN	GN/RT
113 V	GE					GE	GN	RT
114 V	GE					GE	GN	RT
115 V	GE				GE	GE/GN	GN/RT	RT
116 V	GE				GE	GN	RT	RT
117 V	GE				GE	GN	RT	RT
118 V	GE			GE	GN	RT		RT
119 V	GE			GE	GN	RT		RT
120 V	GE		GE	GE/GN	GN	RT		RT
121 V	GE		GE	GN	GN/RT	RT		RT
122 V	GE		GE	GN	RT			RT
123 V	GE	GE	GE/GN	GN	RT			RT
124 V	GE	GE	GN	GN/RT	RT			RT
125 V	GE	GE	GN	RT				RT
126 V	GE	GE/GN	GN	RT				RT
127 V	GE	GN	GN/RT	RT				RT
128 V	GE	GN	RT					RT
129 V	GE	GN	RT					RT
130 V	GN	GN/RT	RT					RT
131 V	GN	RT						RT
132 V	GN	RT						RT
133 V *	GN	RT						RT

Legend

GE = yellow
GN = green
RT = red

Chart A

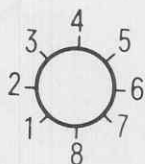
Note: A one position shift of the LED display in relation to the switch position S6 can occur if the actual line voltage lies in between the voltage values shown on the chart.

Example :

Indicated line voltage — position of S6 — LED lit

Instrument "P"

121



1 to 3 Yellow

4 Green

5 Green or Red

6 to 7 Red

Y G R

○ ○ ○

Verify power supply adequacy

With the multimeter connected to K3 N,L (see figure 48). AC input, unit turned on, linecompensation adjusted, green LED lit.

Verify that the voltage indicated on your measuring instrument coincides with instrument P (see figure 49). Note the value indicated (no load).

Set the exposure time by rotating the object button. To 3,2 s indicated by the orange line on the object/time selector.

Make an exposure



Observe the voltage reading (under load)

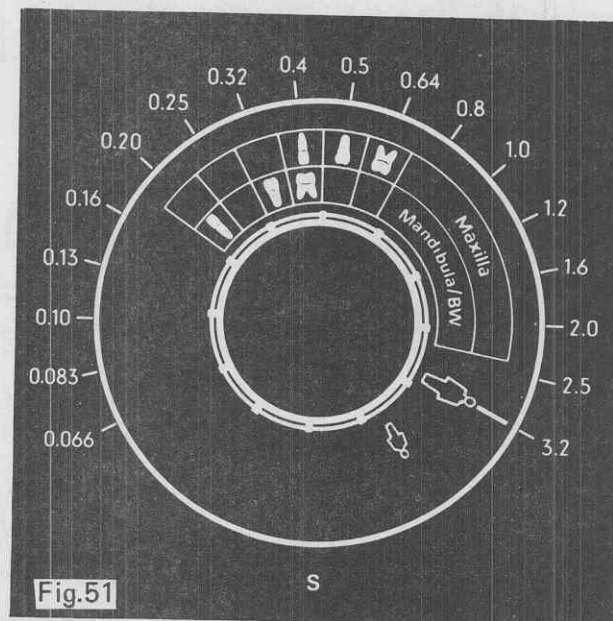


Fig.51

To calculate the power supply adequacy, enter below the measured values, starting with the no load voltage.

NO LOAD VOLTAGE

VOLTAGE UNDER LOAD

VOLTAGE DROP

..... V

..... V

..... V

The maximum permissible VOLTAGE DROP must not exceed 6,0 V in the exposure range given. In the event, that the power is insufficient an adequate power supply must be found.

Tube current

Remove the 9-10 jumper from Circuit Board D 1.

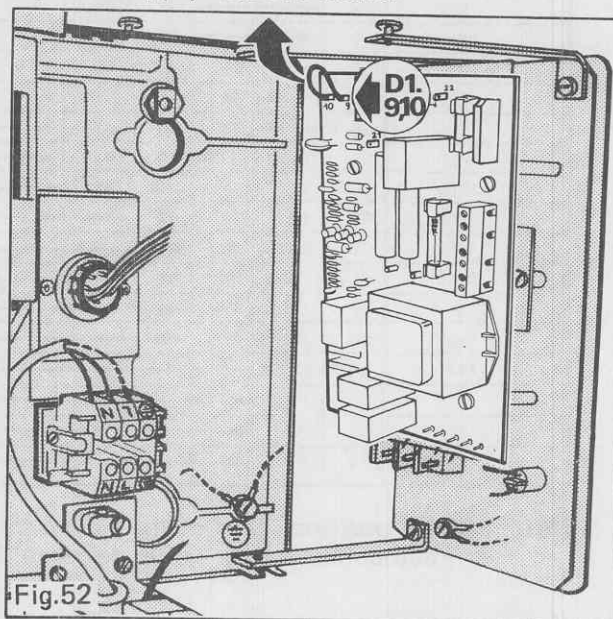


Fig.52

Connect the multimeter to D 1.9 - 10
 Select DCmA range (10 DCmA).
 Set 2,0 sec. on the time selector

Make an exposure.

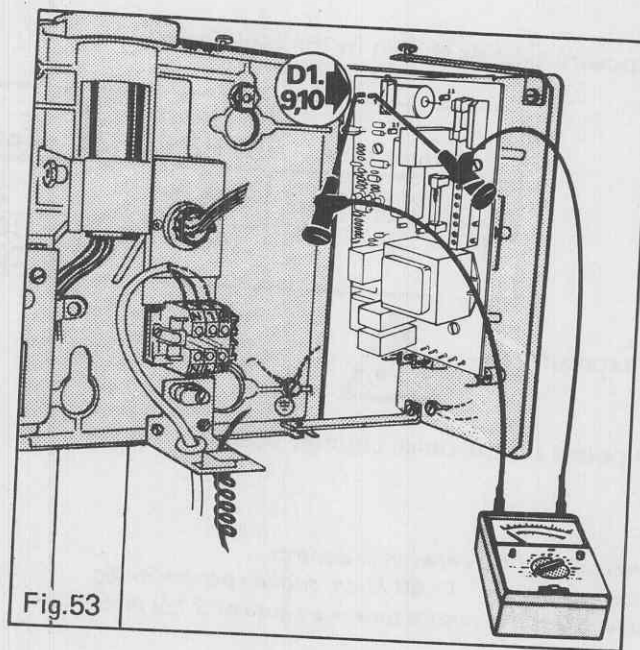


Fig.53

The buzzer must sound and the **red** radiation light on the front panel must light up.

Note the mA value on the instrument.

The reading should be 7 DCmA (tolerance + 1,2 DCmA - 2 DCmA 60 HZ / +1,0 DCmA - 2,5 DCmA 50 HZ)

The exposure must be terminated at once if the exposure button is prematurely released (deadman feature).

Disconnect the instrument.

Reinstall the jumper 9 - 10 on circuit board D1.

Exposure time

The exposure time **must** be checked with a mechanical counter or equivalent.
 The counter is connected as described below.

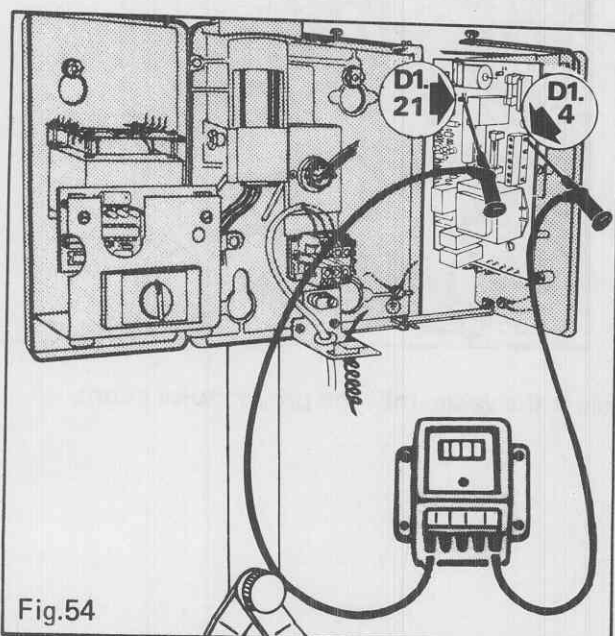
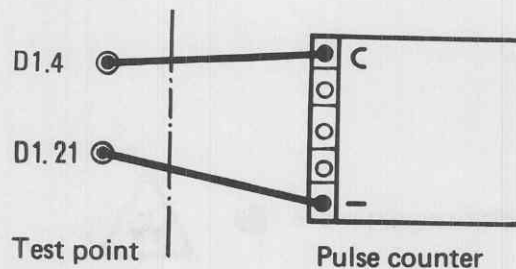


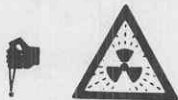
Fig.54



Set the exposure time as shown in the table below.

Exposure time	Pulses		Tolerance
	50 HZ	60 HZ	
0.066 sec.	3	4	+ 1 pulse - 2 pulses
3,2 sec.	160	192	+ 10 pulses - 20 pulses

Make an exposure



Note the pulses on the pulse counter used.

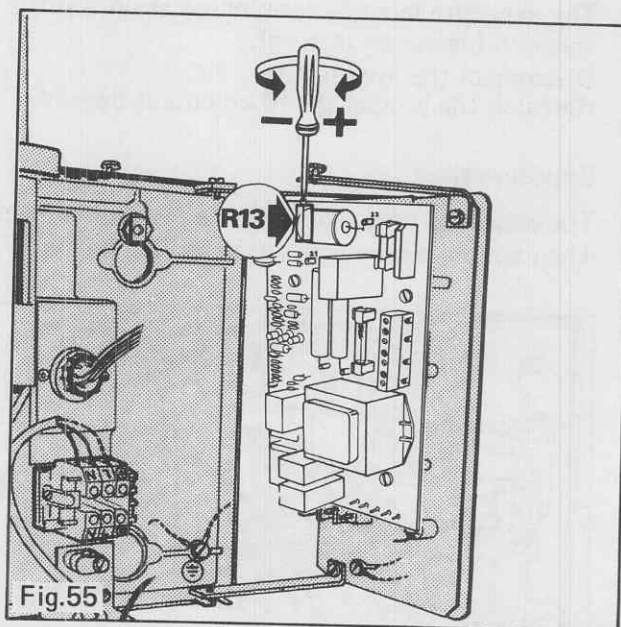
Caution:

Observe the cooling time between exposures.

Relative power duration: 1 : 60 / min. cooling period 20 sec.

For example, 3,2 sec. exposure time — a pause of 3 1/2 min.

If the measured pulse count does not agree with the data as indicated, adjust as follows:



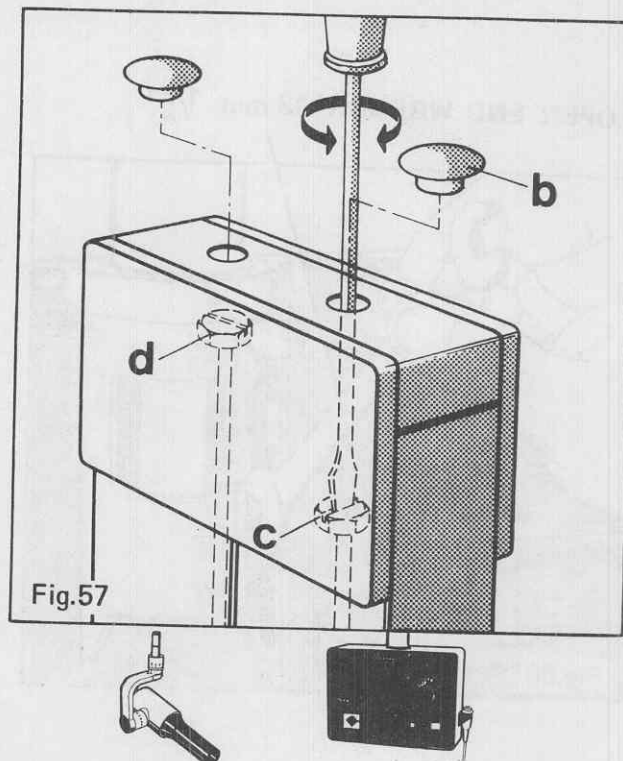
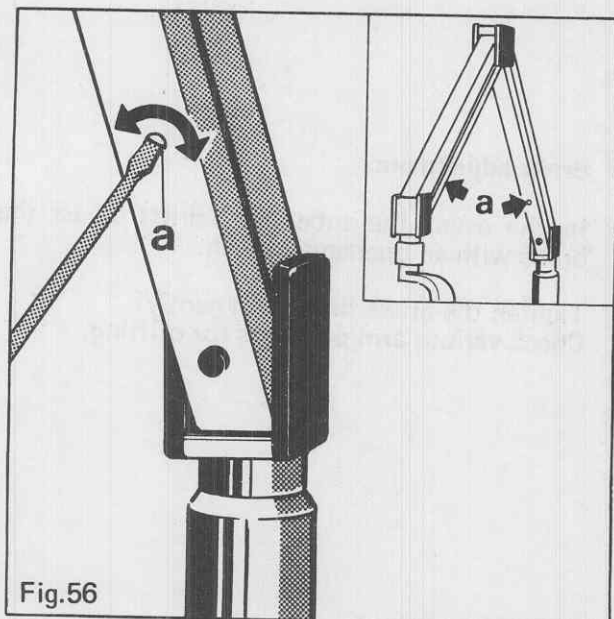
Make an exposure.



With potentiometer R13 on the circuit board D1, adjust the value until the proper pulse count is obtained.

⊕ = Increase the exposure time

⊖ = Decrease the exposure time

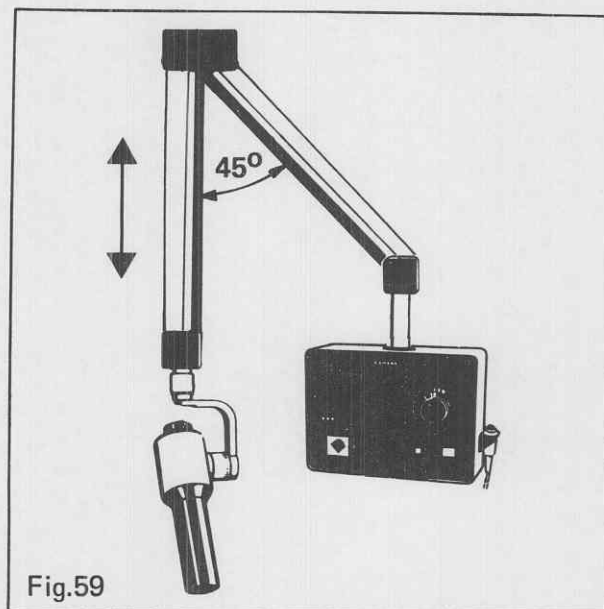
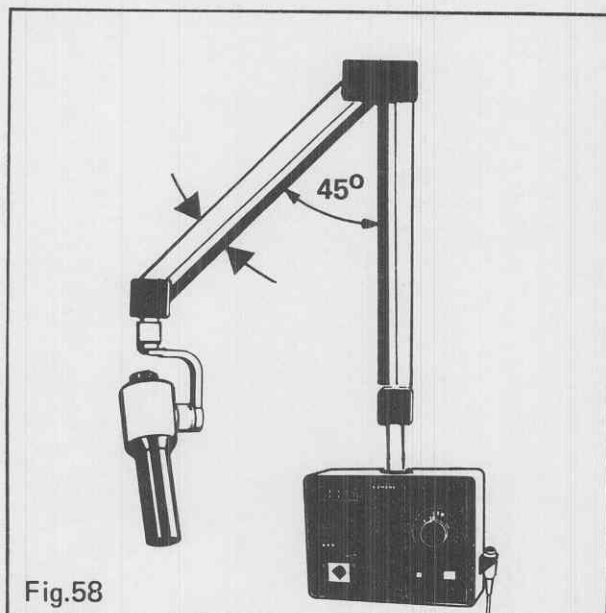


Mechanical adjustments (if required)

1. Spring adjustment

Adjustment Possibility of the spring counter poise.

The spring counter poise is set at the factory. However, it is possible to make readjustments after installation at the customer's facilities. Loosen screws (a) by turning (1 1/2 turns max.). The two spring adjustment screws (c,d) are accessible at the double joint when the folded arm is in a vertical position and after removal of the caps (b). One of the screws heads is lower but is accessible with a medium size screwdriver held in vertical position. Clockwise movement increases the spring tension. Finally tighten screws (a) again.

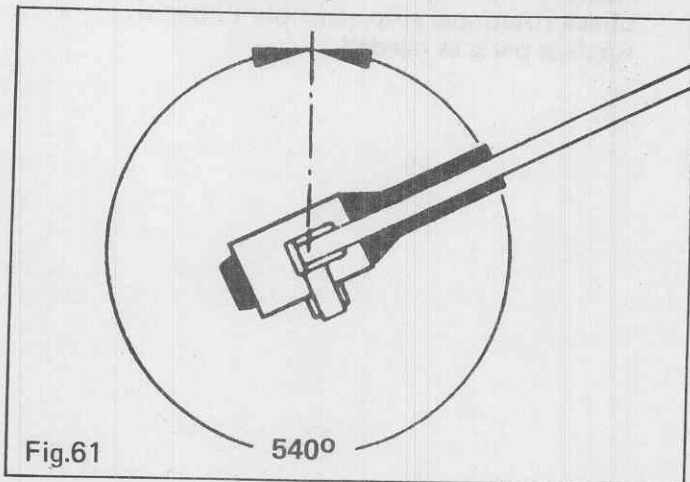


2. Friction pad

The adjustment sequence is: loosen screw (a) of arm to be adjusted (1 1/2 turns). Position the X-ray head in a 45° angle to the vertical scissor arm. The arm with the X-ray head shall remain stationary at a 45° angle as shown. When lowering the X-ray head (to less than 45°) the X-ray head must return to 45° angle by itself when released. Spring adjustment is made with screw (d).

When raising the X-ray head (to more than 45°) the X-ray head must return again by itself when released. Spring adjustment is made with screw (c).

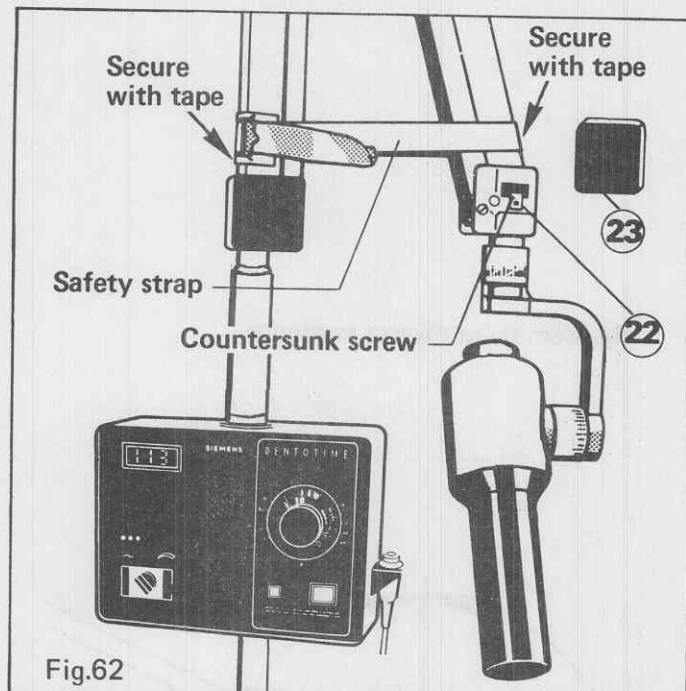
Tube head rotational stop



Test the tube head rotation from stop to stop for 540° (1 1/2 turns).

Rotational parts may require replacement.

To inspect, remove X-ray head from scissor arm as follows:



To facilitate the removal of the X-ray head, the scissor arm must be secured with the safety strap as shown.

Remove cap and cover.

Disconnect wires in the U-channel and ground wire ⊕.

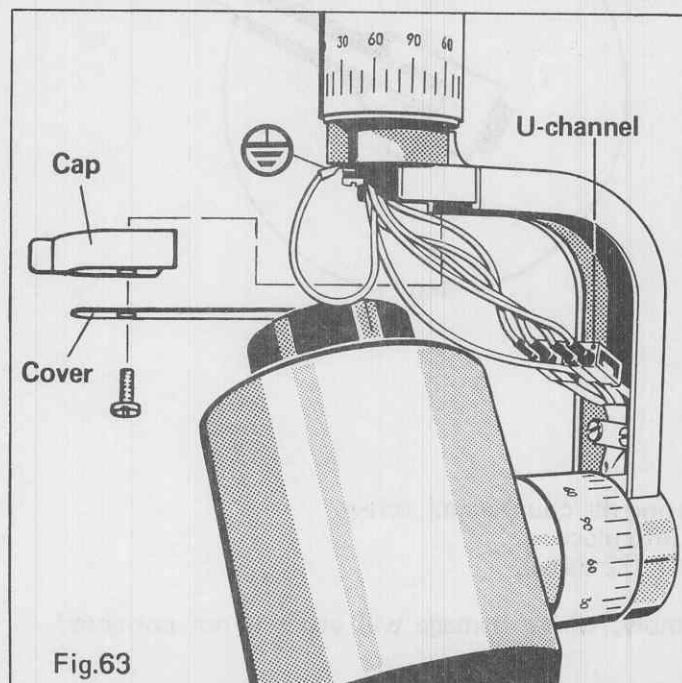
CAUTION:

The wires must be marked as follows:

X-ray tube assembly wires	3	4	5	6
Scissor arm wires	3	4	5	6

Remove cover (23).

Remove countersunk screw from bracket (22). Hold X-ray head at the yoke and remove bracket (22). Remove X-ray head.



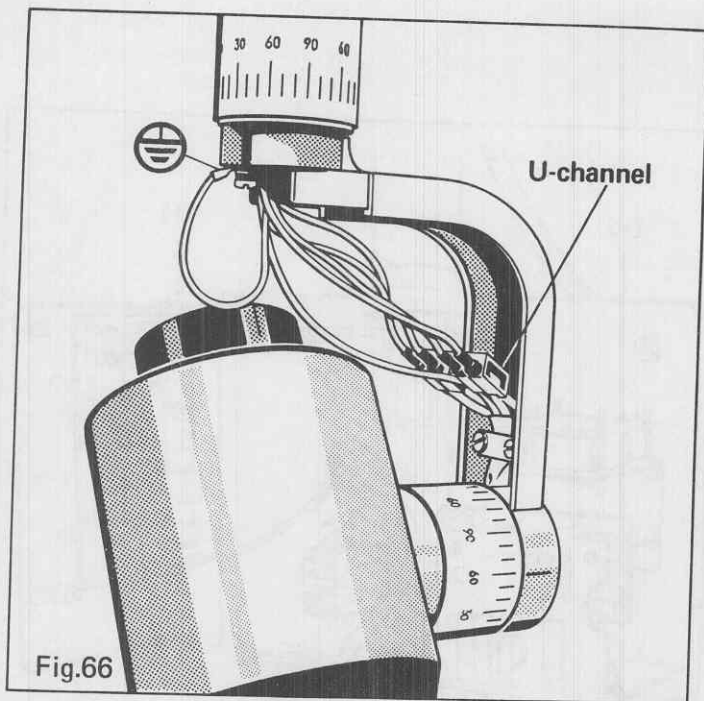


Fig.66

Connect the five wires of the X-ray tube assembly to the wires of the scissor arm according to the markings.

X-ray tube assembly wires	3	4	5	6
Scissor arm wires	3	4	5	6

Ground Connections

Connect the leads as shown and secure

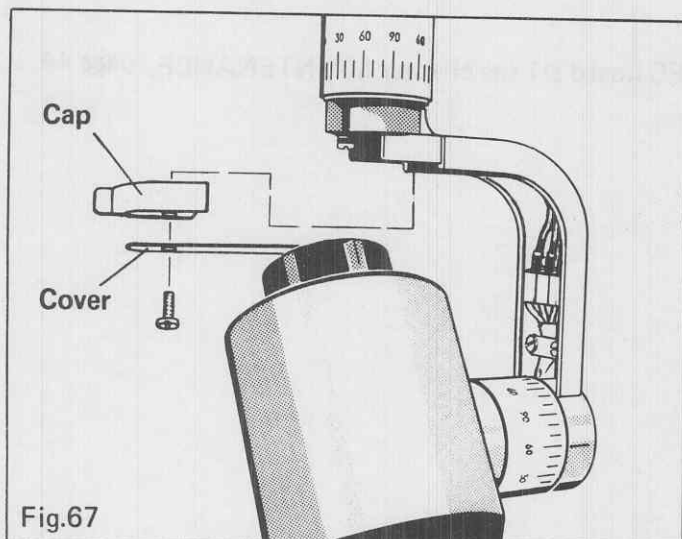


Fig.67

Press in U-channel

Place cap on yoke TAKE CARE NOT TO PINCH ELECTRICAL WIRES

Place cover over yoke and fasten with screw.

Wiring exchange in scissor arm: WE DO NOT RECOMMEND a field repair.
Defective scissor arms shall be returned to SIEMENS MEDICAL SYSTEMS, INC. Dental X-Ray Division
(address see rear)

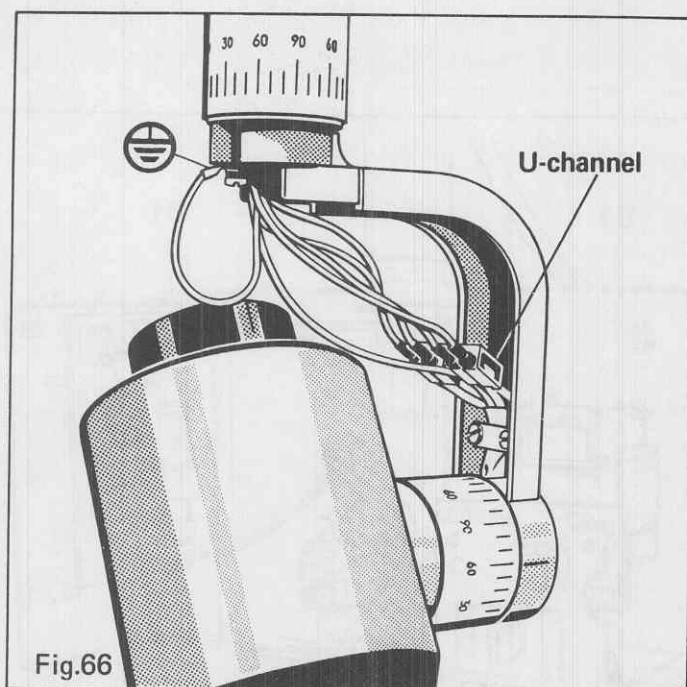


Fig.66

Connect the five wires of the X-ray tube assembly to the wires of the scissor arm according to the markings.

X-ray tube assembly wires	3	4	5	6
Scissor arm wires	3	4	5	6

Ground Connections

Connect the leads as shown and secure

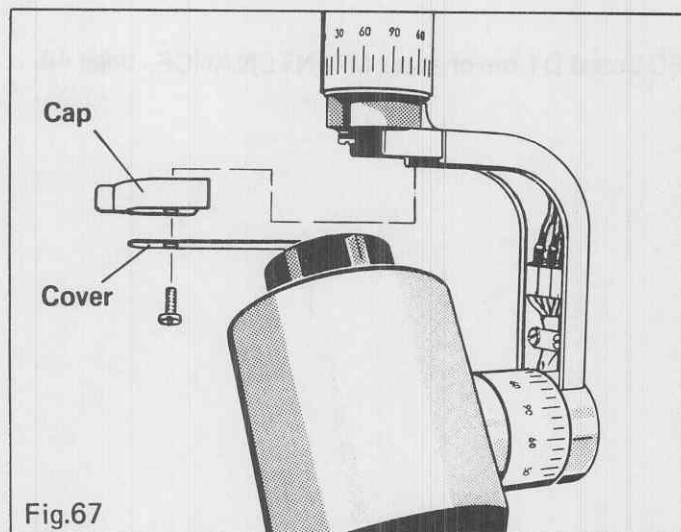


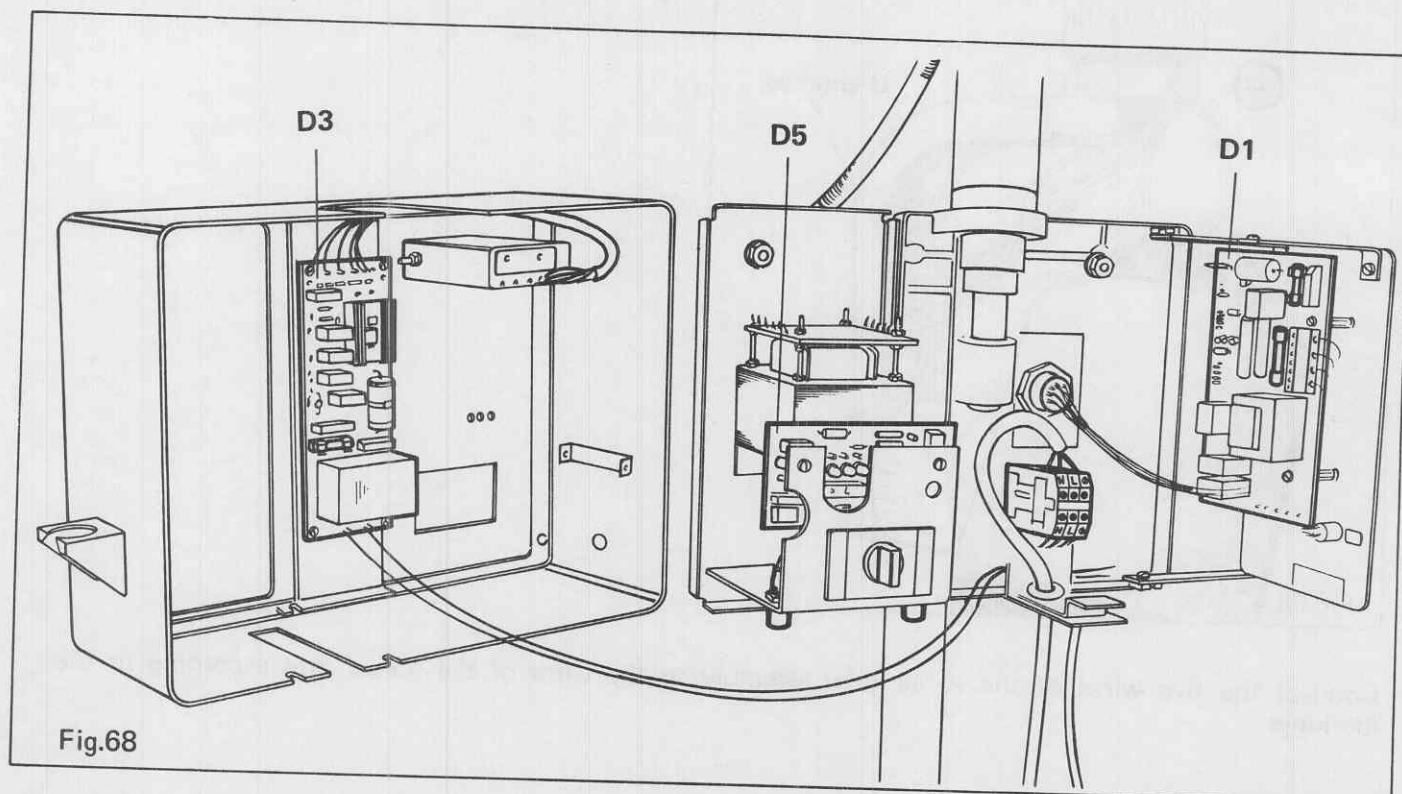
Fig.67

Press in U-channel

Place cap on yoke TAKE CARE NOT TO PINCH ELECTRICAL WIRES

Place cover over yoke and fasten with screw.

Wiring exchange in scissor arm: WE DO NOT RECOMMEND a field repair.
Defective scissor arms shall be returned to SIEMENS MEDICAL SYSTEMS, INC. Dental X-Ray Division
(address see rear)

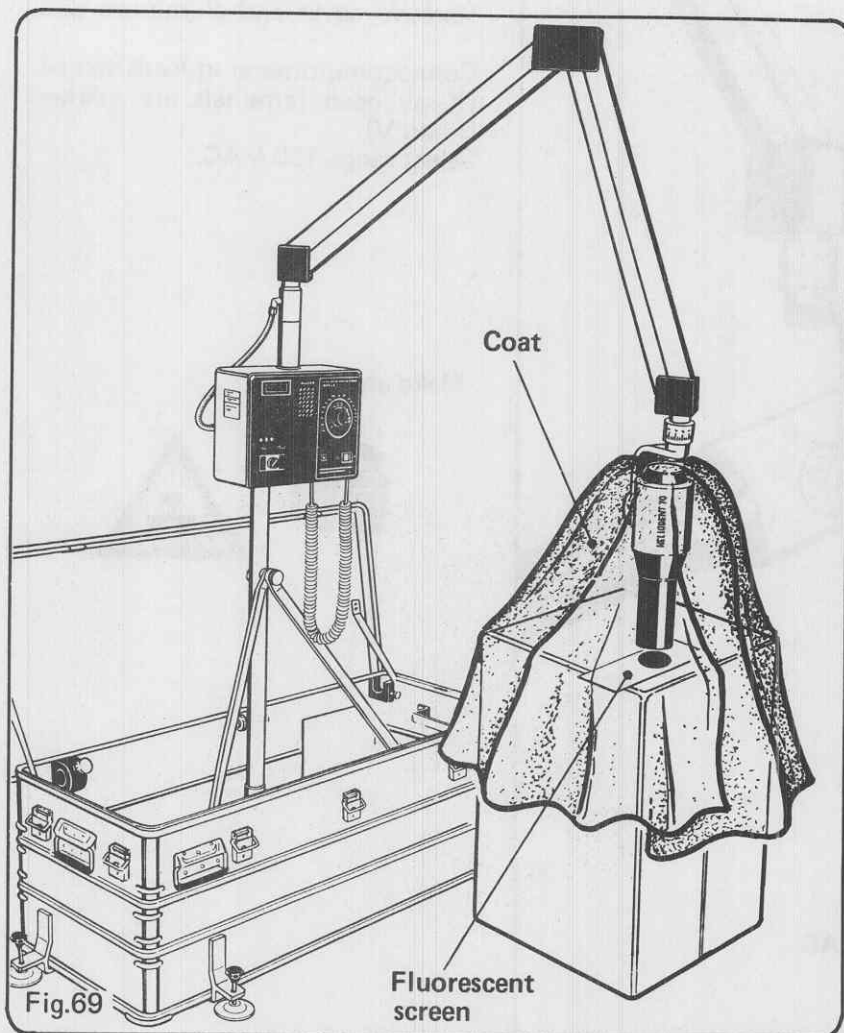


PC boards D1 and D3 may be exchanged with the aid of a screw driver.
PC board D5 requires a soldering tool.

All PC boards are factory calibrated. For adjustment of PC board D1 see chapter MAINTENANCE, page 44.

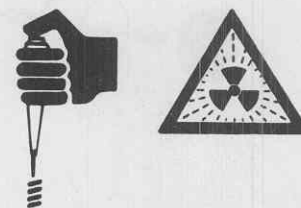
No X-rays emitted from tube head — blank radiographs

X-ray output can be checked with a fluorescent screen, if available.



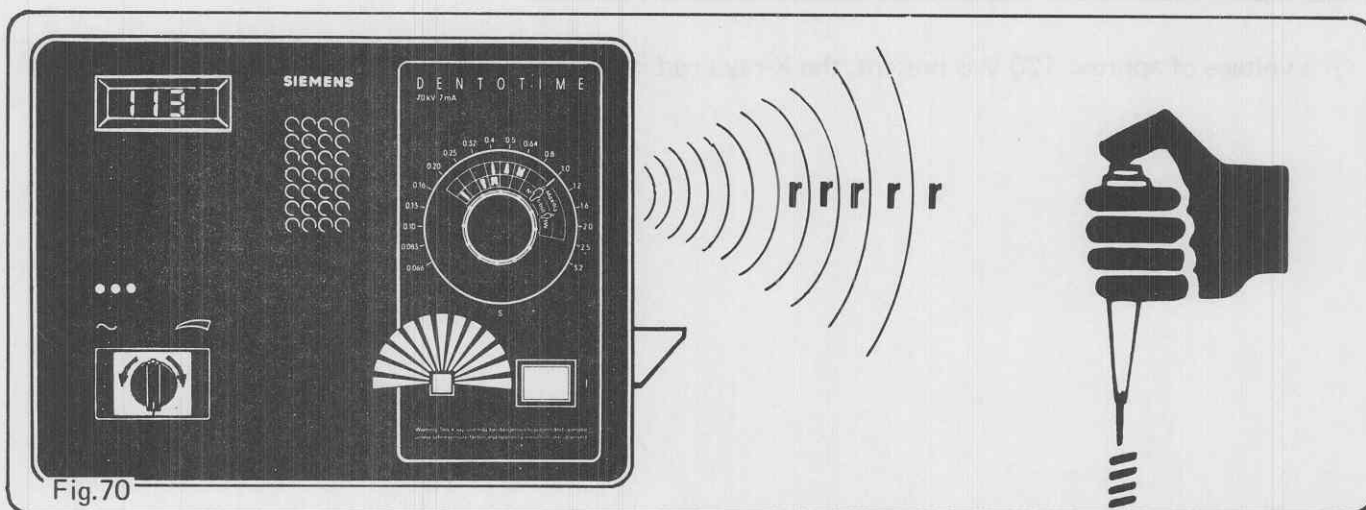
Place the fluorescent screen on a table or counter top as shown. Place a coat over the X-ray head in order to dim the surrounding area. Set exposure time 1,0 sec.

Make an exposure



During the exposure the radiation will be visible on the fluorescent screen.

At the same time, the red radiation indication lamp at the DENTOTIME must light up, simultaneously audible sound is present.



If no X-rays are present but all visual and audible indicators are functional, make electrical measurement as follows.

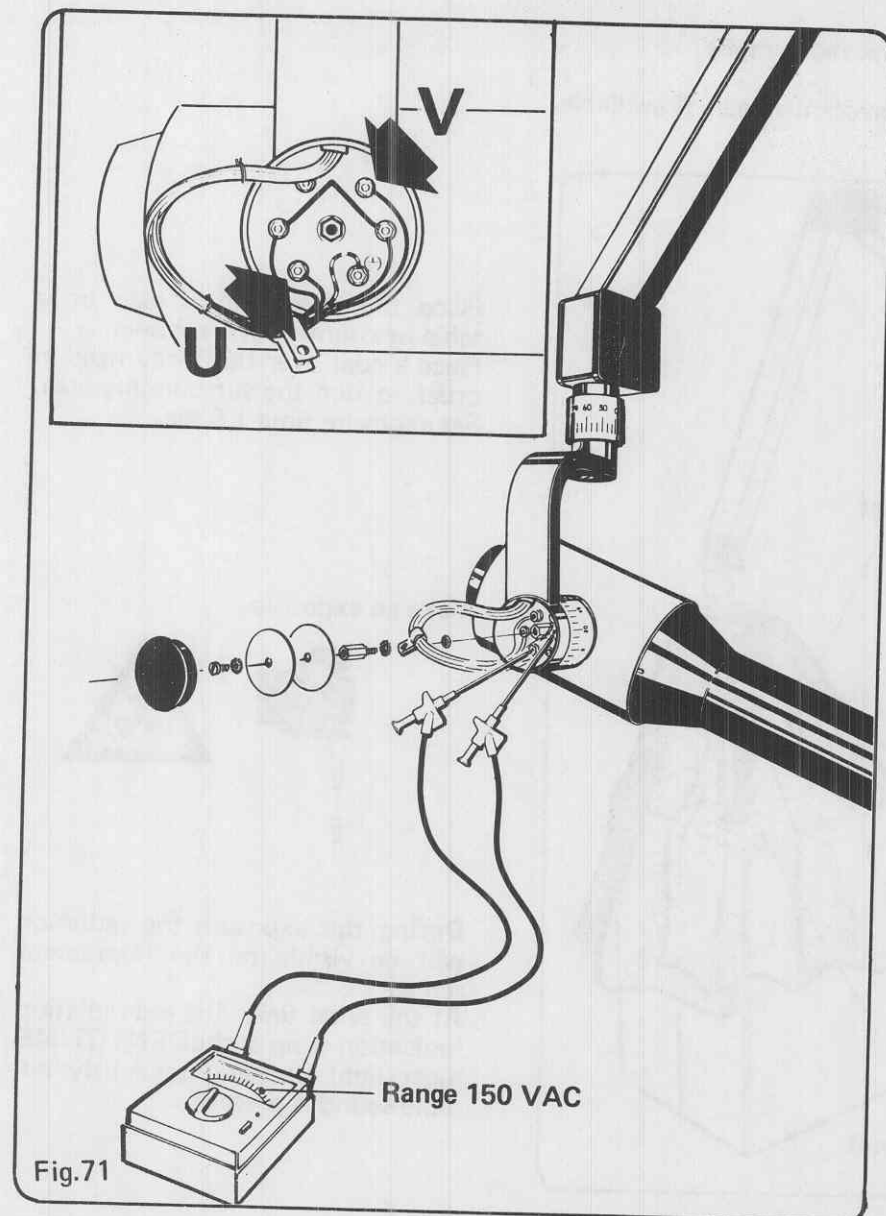


Fig.71

Electrical measurement

Remove cover and aluminum disc.

Connect multimeter at leads 3 and 4.
(X-ray head terminals are marked U and V).

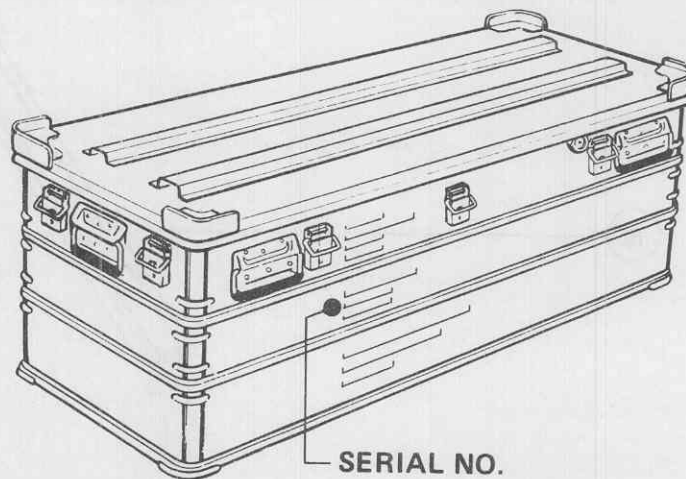
Select range 150 VAC.

Make an exposure



If a voltage of approx. 120 V is present, the X-ray head is defective and must be exchanged.

STORAGE INSPECTION PROCEDURE



SERIAL NO.

First inspection: 18 months after date of manufacture

Further inspections: every 12 months thereafter

UNIT's SERIAL NO.

	Date of inspection			Inspectors name	Signature
	Month	Day	Year		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

ASSEMBLY INSTRUCTIONS FOR PORTARAY - MODEL D 3152

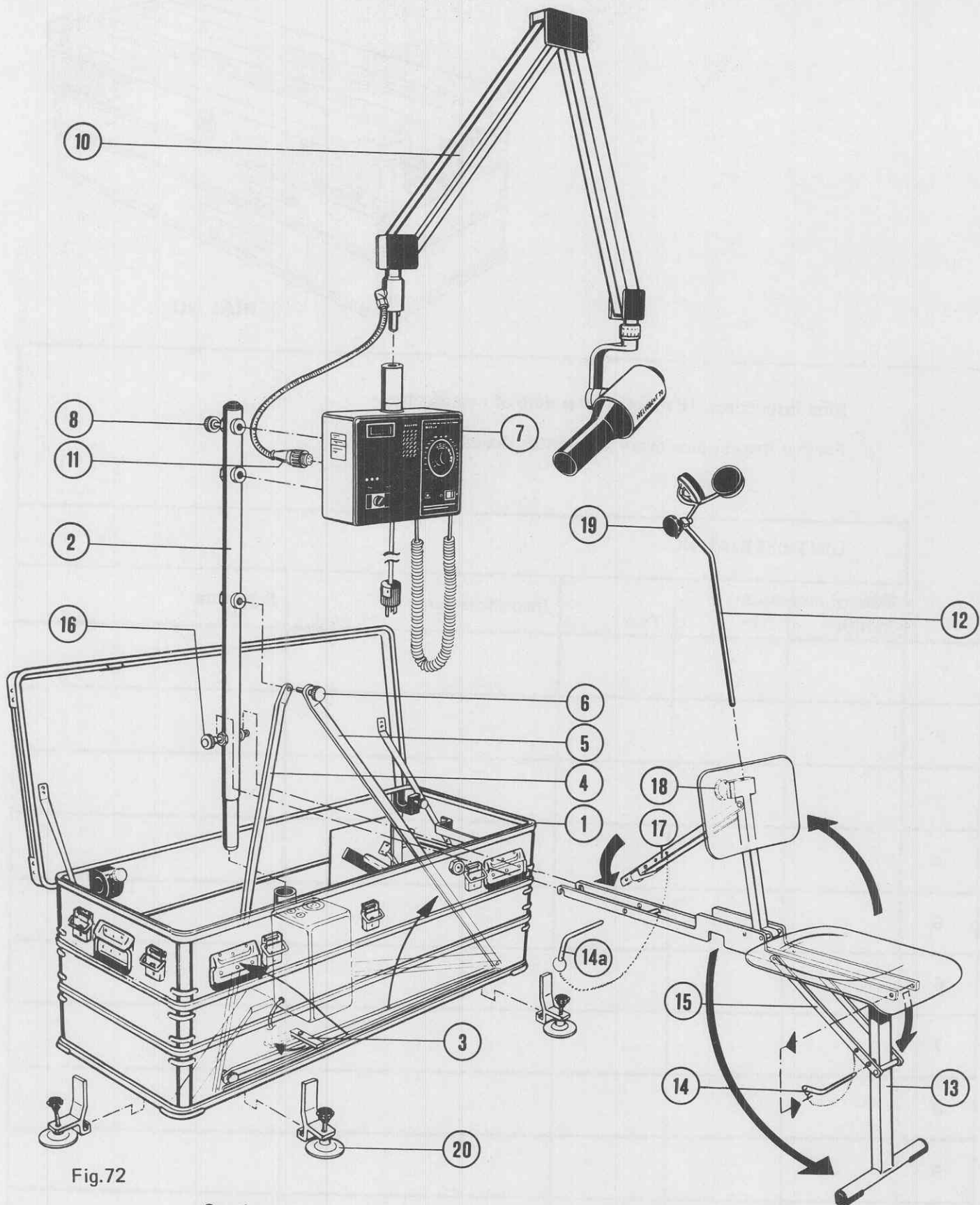


Fig.72

Caution:

After the completed assembly the carrying case must be leveled.

Set-up

1

Remove all components from carrying case (1).

Lay out components keeping numbers in sequence.

Insert upright (2) into base, swing bracket (3) in the direction of the arrow.

Lift support bars (4) and (5), secure same in upright as shown with knob (6).

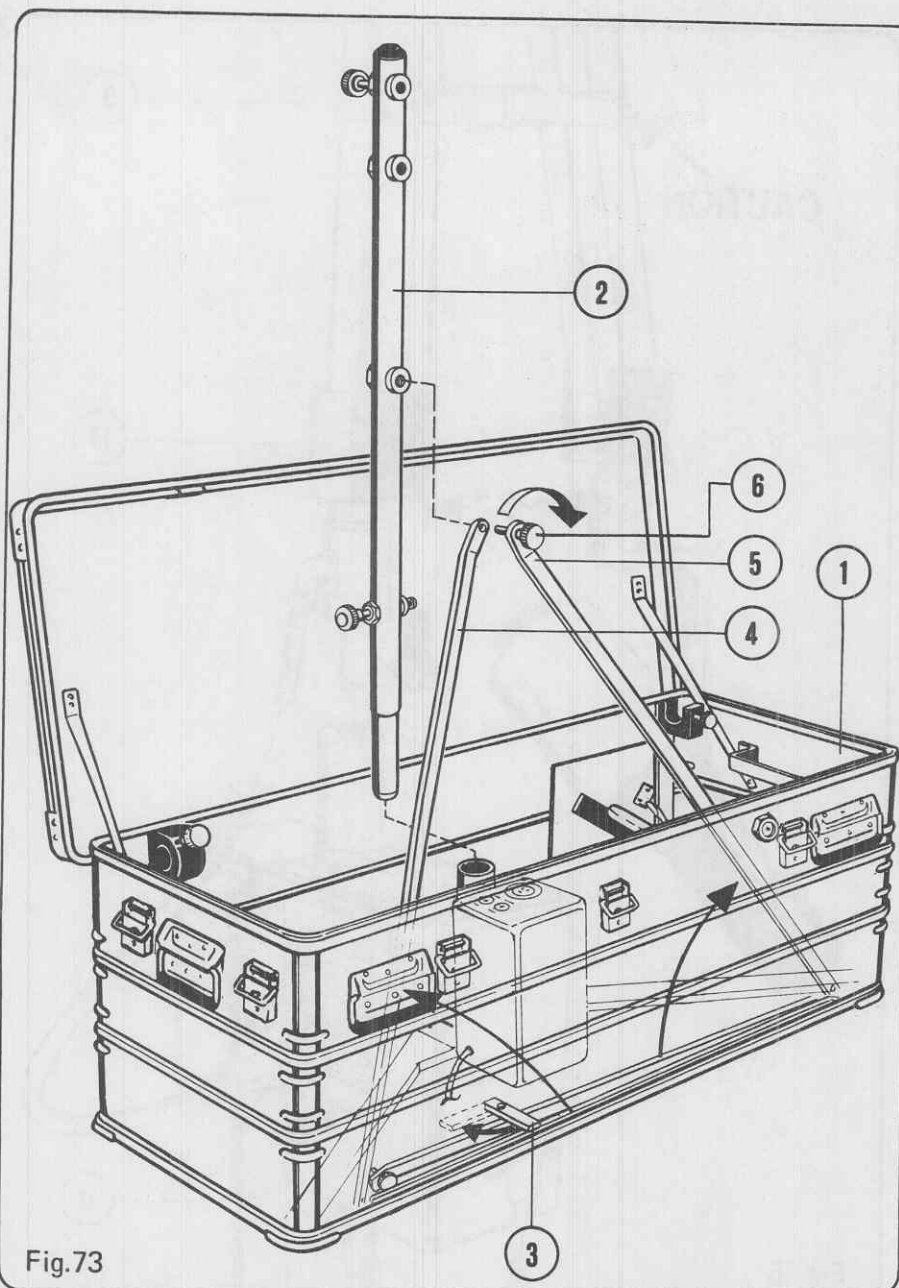


Fig.73

2

Engage dowel pins of X-Ray control adapter (7) in upright, secure with knob (8).

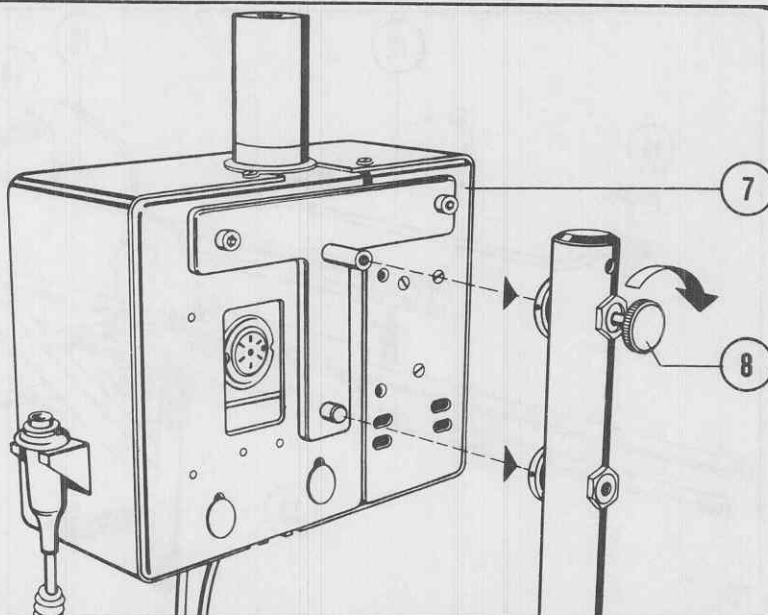


Fig.74

3

Loosen safety strap (9) to permit a 6" opening of the scissor arm (10) before engaging the arm in the coupling as shown.

CAUTION! To prevent accidental opening of the spring loaded scissor arm, causing injury and arm damage. **DO NOT REMOVE** safety strap completely, unless the arm is fully engaged in the coupling.

Connect multi pin plug (11) secure with lock ring in direction of arrow.

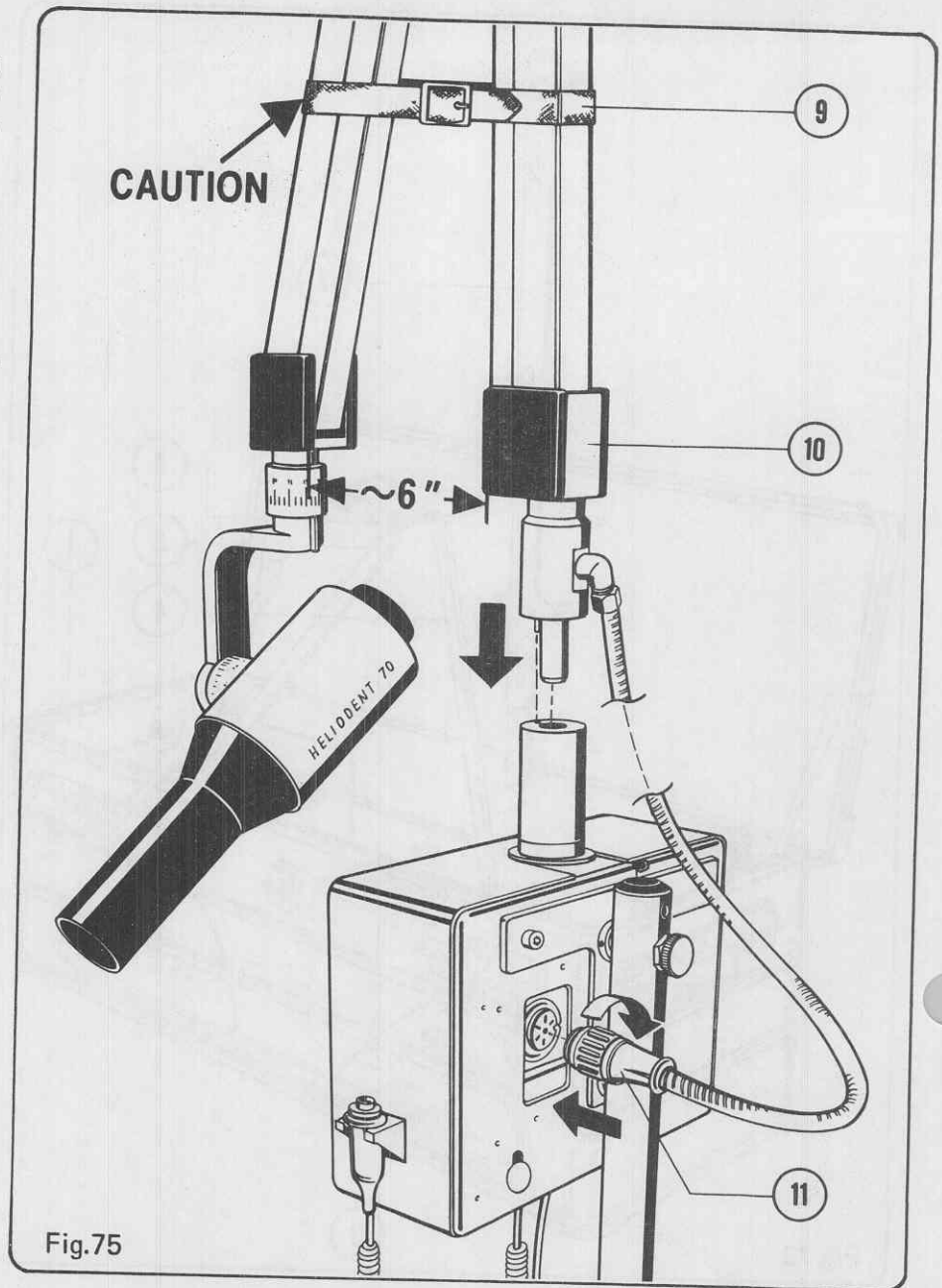


Fig. 75

4

Loosen knob (18), remove headrest assembly (12) from storage position. Remove safety pin (14). Unfold stool leg (13) and retainer bracket (15). With stool leg fully extended secure same with safety pin as shown see detail.

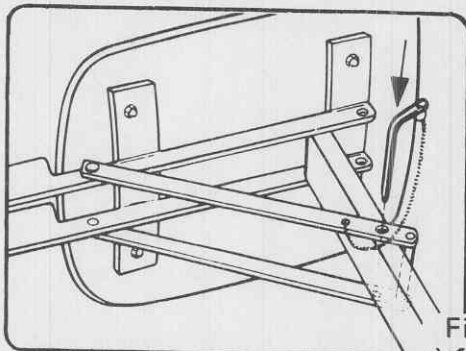
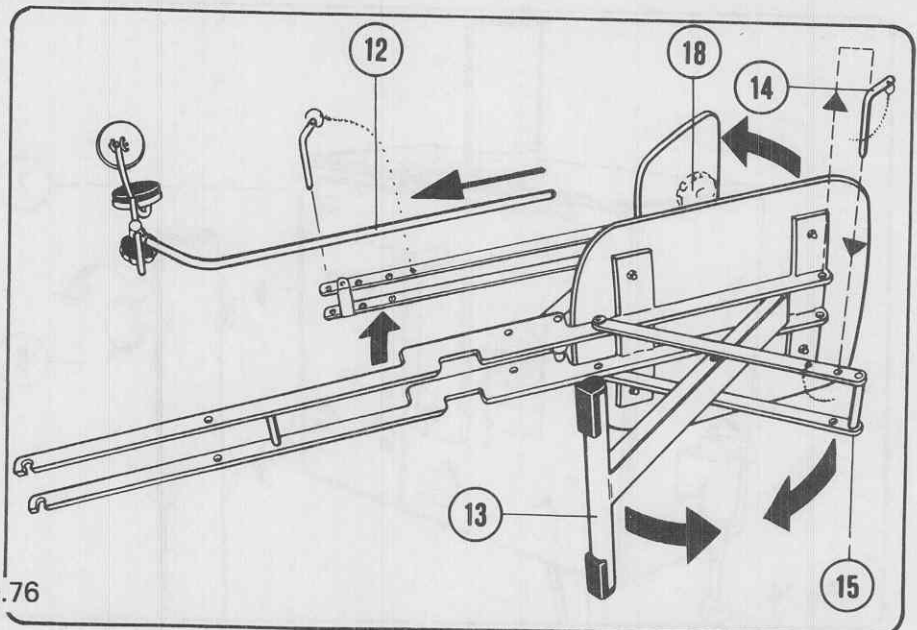


Fig. 76



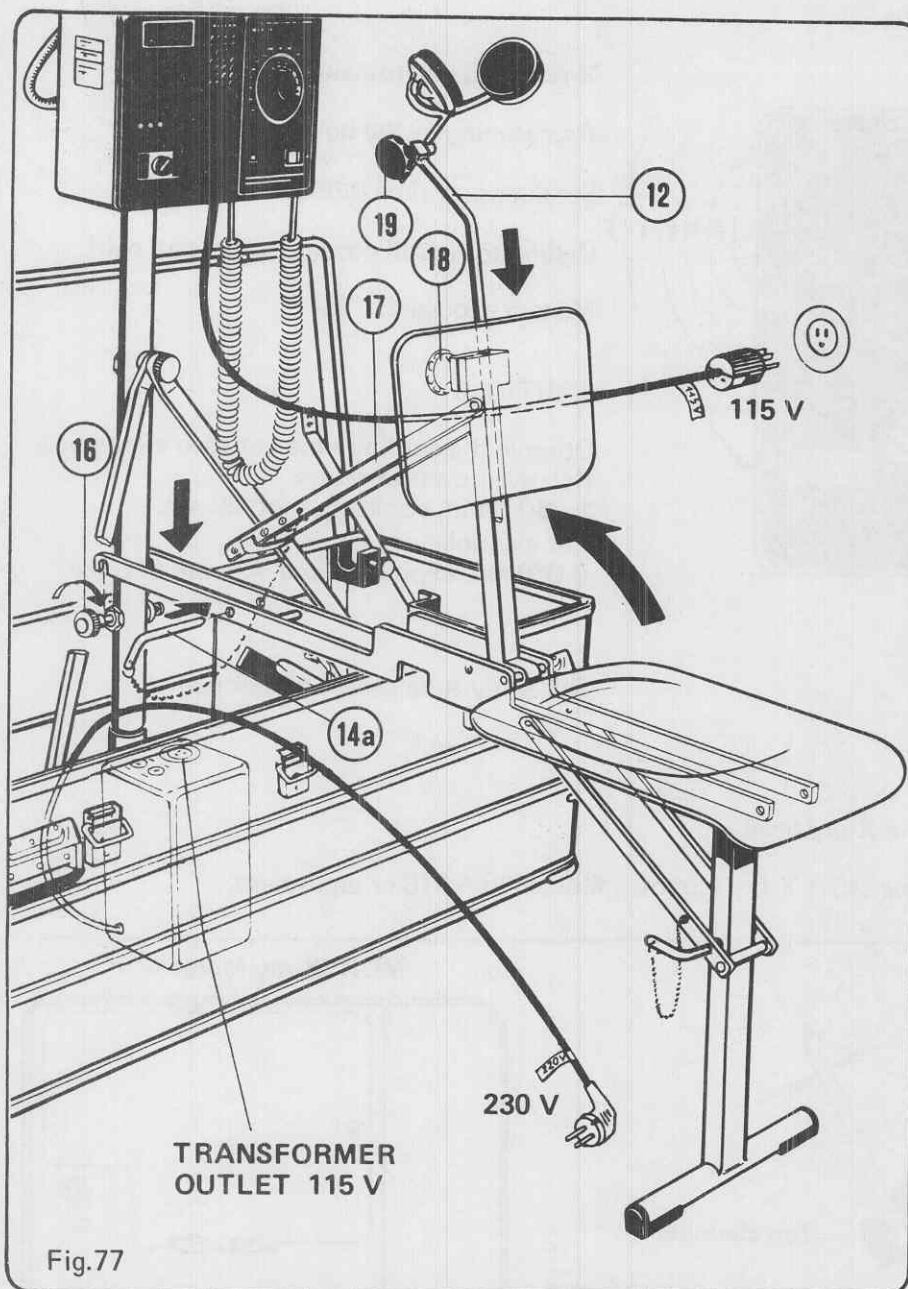


Fig. 77

5

Engage stool support in upright, secure with knob (16). Raise backrest in direction of arrow. Position backrest with backrest brace (17) (3 positions) and secure with safety pin (14a). Insert headrest assembly (12), secure with knob (18) (headrest height adjustment).

Adjust headrest cradle position with knob (19).

When the power supply is 115 V:
Connect the power cord directly into the 115 V wall outlet.

When the power supply is 230 V:
Connect the power cord at the transformer's 115 V outlet and connect the transformer's power cord into the 230 V wall outlet.

In case of a portable gasoline-diesel driven generator this generator must meet the following technical characteristics:

Power rating: 5 kVA,
Volts: 230 V nominal, single phase
Max. permissible deviation: 207 to 253 VAC

Max. permissible fluctuation of line voltage during standby: 1.5 % at 230 VAC.

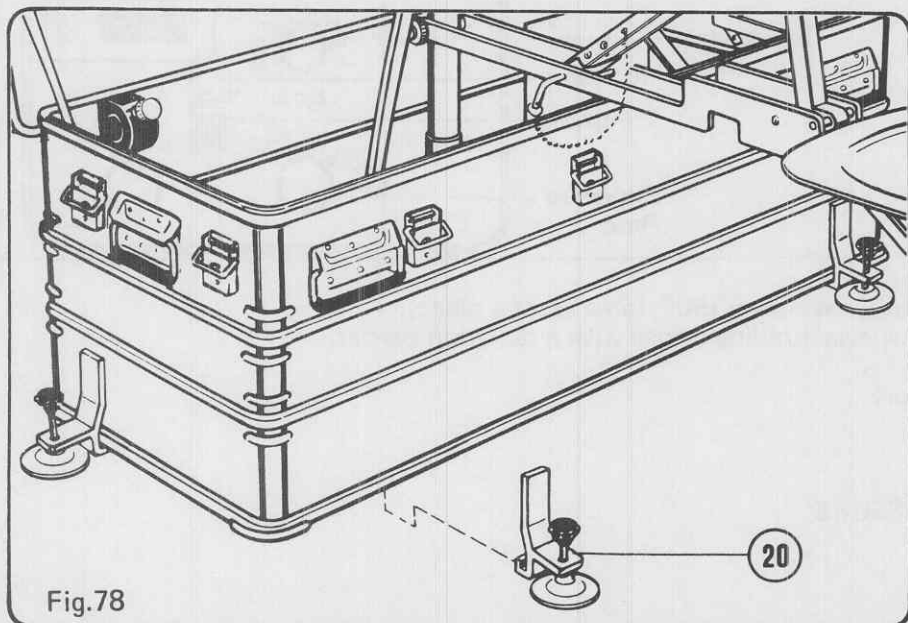


Fig. 78

6

Level carrying case and upright with the aid of 3-leveling devices (20).

The leveling devices hook to the lower carrying case frame.

Radiation output performance verification

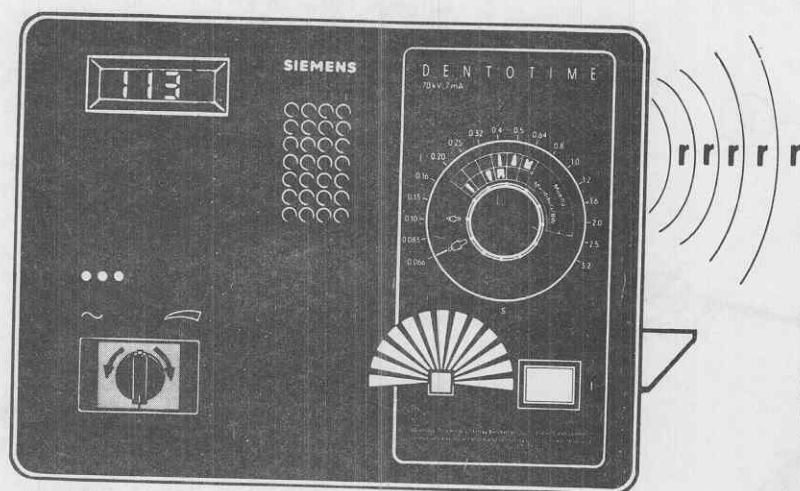



Fig.79

X-ray head performance test

Reseasoning of the built-in X-ray tube.

Set exposure time 0.066 sec.

Collimator is still covered with lead cap!

Make 5 exposures. 

CAUTION:

Observe the cooling time between exposures.
Relative power duration:

1 : 60 / min. cooling period 20 sec.

For example,

0.066 sec. exposure time — pause of 5 sec.

The X-ray tube is now reseasoned.

Dose Measurement

Set exposure time 1.0 sec.

Remove lead cap from collimator of the X-ray head.

The measurement is carried out with the MDH X-ray Monitor, Model No. 1015 or equivalent.

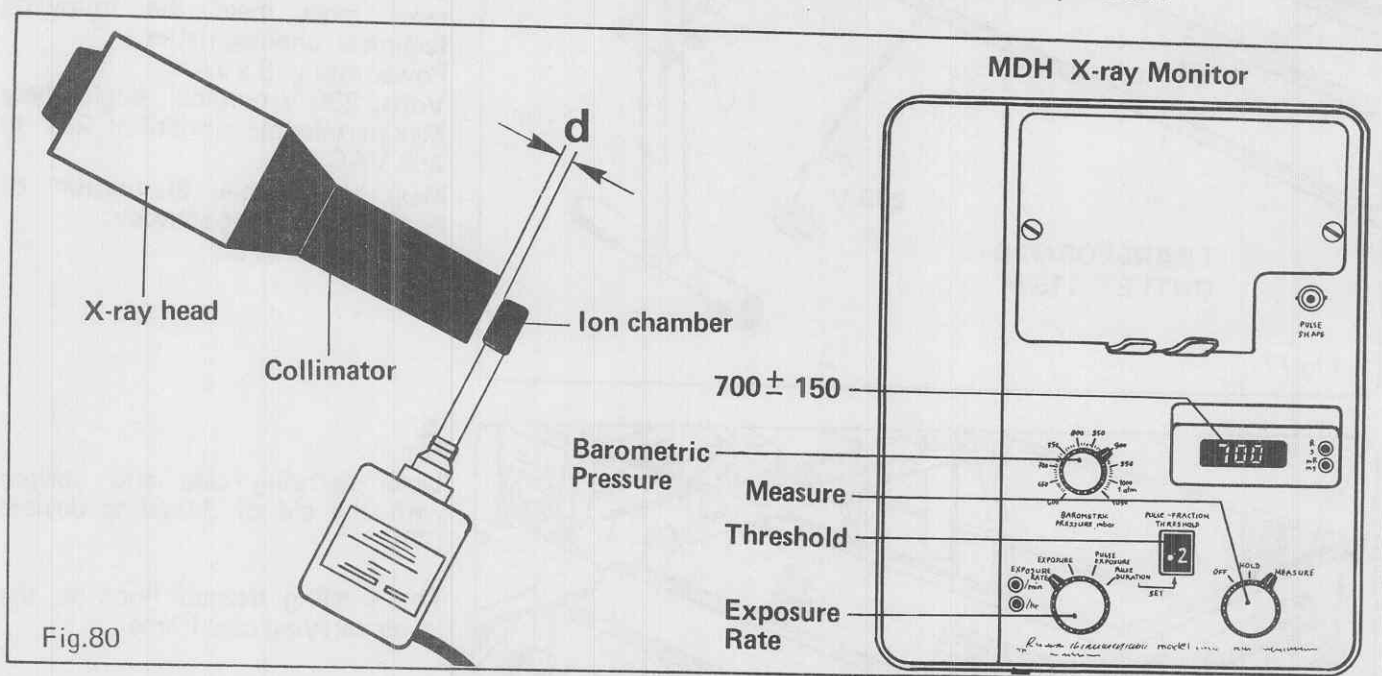


Fig.80

Position the X-ray head to the ion chamber as shown (90°, same central plane).

For reproducibility we recommend a special holding device with a radiation barrier.

Adjustments to the MDH X-ray Monitor:

- Set THRESHOLD to 0.2
- Set to proper BAROMETRIC PRESSURE
- Set to EXPOSURE RATE
- Set to MEASURE

Make an exposure

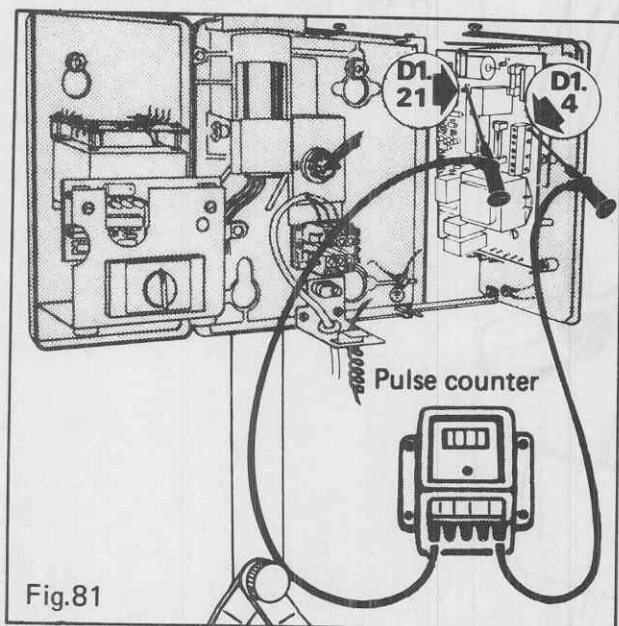


**WARNING:
RADIATION!**

The measured dose should be 700 mR plus minus 150 mR.

For reproduceability note the distance , where the measured dose value is obtained. Distance d:

In the event the dose levels are lower than specified above, the X-ray head needs to be replaced.



Checking the exposure time

Pulse counter Model - KESSLER ELLIS KT
203 ± 1 pulse.

Connect pulse counter as shown.

Set exposure time 0.066 sec.

Make four exposures



CAUTION: Observe the cooling time between exposures.

Relative power duration:

1 : 60 / min., cooling period 20 sec.

For example:

0.066 sec. exposure time — pause of 5 sec.

3.2 sec. exposure time — pause of 3 1/2 min.

Note the values:

1. _____ pulses
2. _____ pulses
3. _____ pulses
4. _____ pulses

Total _____ and divide by 4 = _____
average pulse count.



ATTENTION! Installer/Assembler
Measurements followed by this symbol
recorded on the QA Installer Check-



must be
list!

If the average pulse count is not within: 1 to 4 pulses at 50 Hz

2 to 5 pulses at 60 Hz

see MAINTENANCE, page 44.

Set exposure time 3.2 sec.

Make four exposures



Note the values:

1. _____ pulses
2. _____ pulses
3. _____ pulses
4. _____ pulses

Total _____ and divide by 4 = _____
average pulse count.



ATTENTION! Installer/Assembler
Measurements followed by this symbol
recorded on the QA Installer Check-



must be
list!

If the average pulse count is not within: 140 to 170 pulses at 50 Hz

172 to 202 pulses at 60 Hz

see MAINTENANCE, page 44.

Inspection of the gasket

If a mechanical defect (cuts, frayed etc.) is visible, the gasket must be exchanged.

Remove old gasket and clean the gasket retainer groove with a scraper to remove old adhesive.

Apply new adhesive per manufacturer's instruction.

(Adhesive part no.29 78 195 D 3152).
Install new gasket.

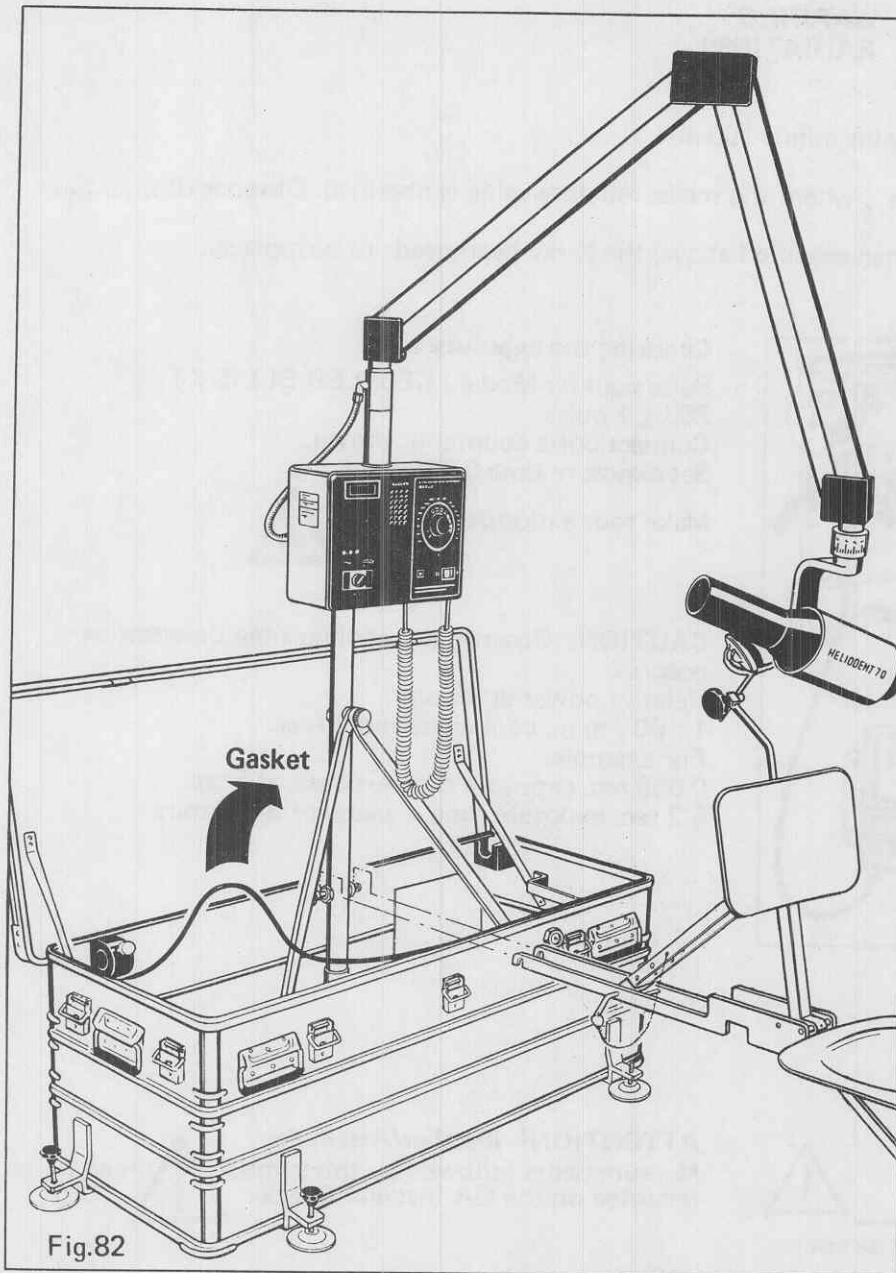


Fig.82

Desiccant bag (Branogel).

The desiccant bag must be exchanged every year.

The desiccant bag in the storage packaging has a color indicator: color blue means "good", color pink means "not good".

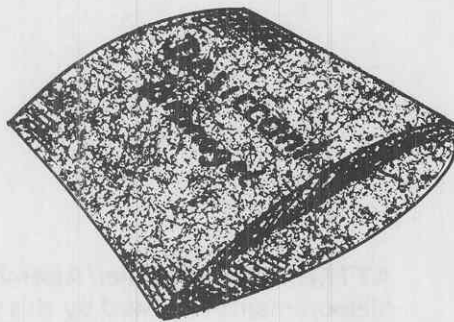


Fig.83

Repacking

Disconnect unit from power supply

1

Remove X-Ray Arm assembly (10) first!!

Place safety strap over scissor arm as shown.

CAUTION! Failure to follow this procedure may cause injury, and/or damage to the scissor arm (the arm is spring loaded).

Loosen locking ring, disconnect multi pin connector, disengage scissor arm assembly from coupling as shown, place protective sleeve (23) over multi pin connector (11), route greenfield tubing tighten strap (9).

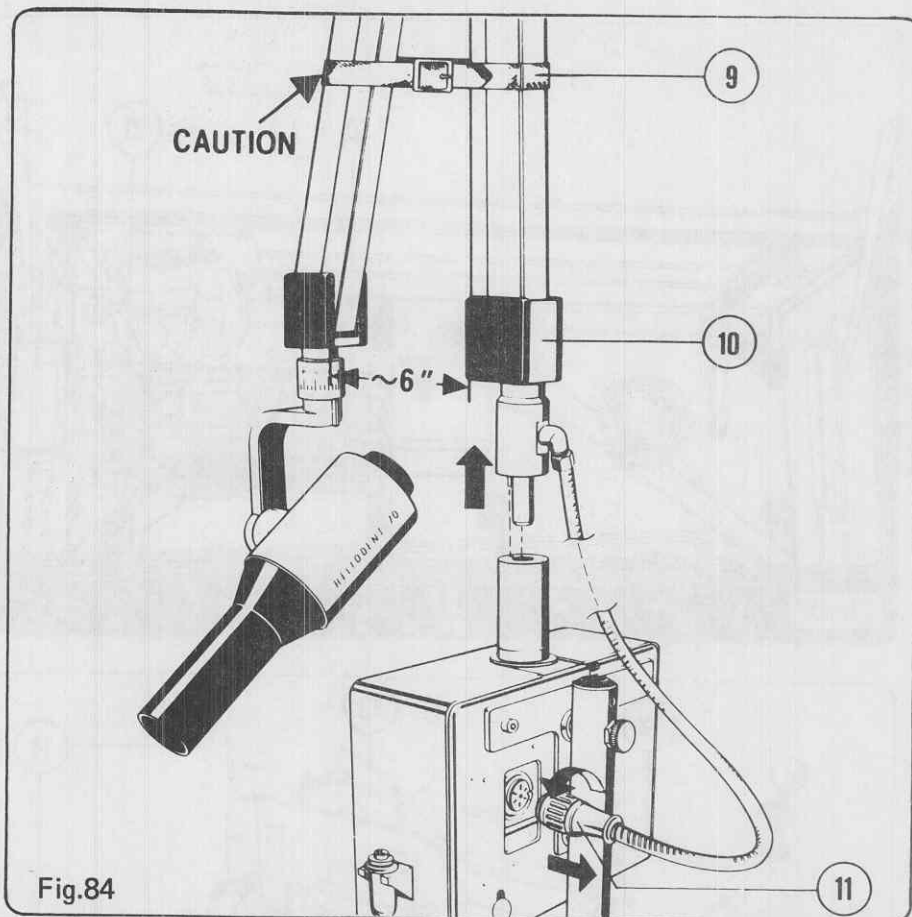


Fig.84

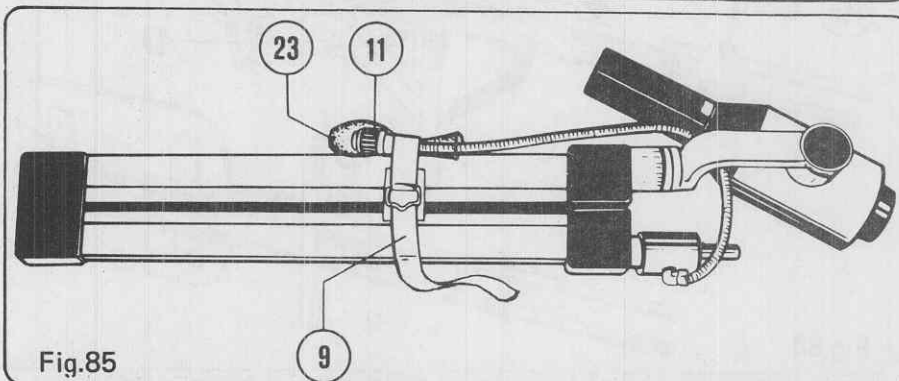


Fig.85

Remove all other components.

Fold support bars (4) and (5), secure with bracket (3) in the direction of arrow.

Store leveling brackets (20) as shown and secure.

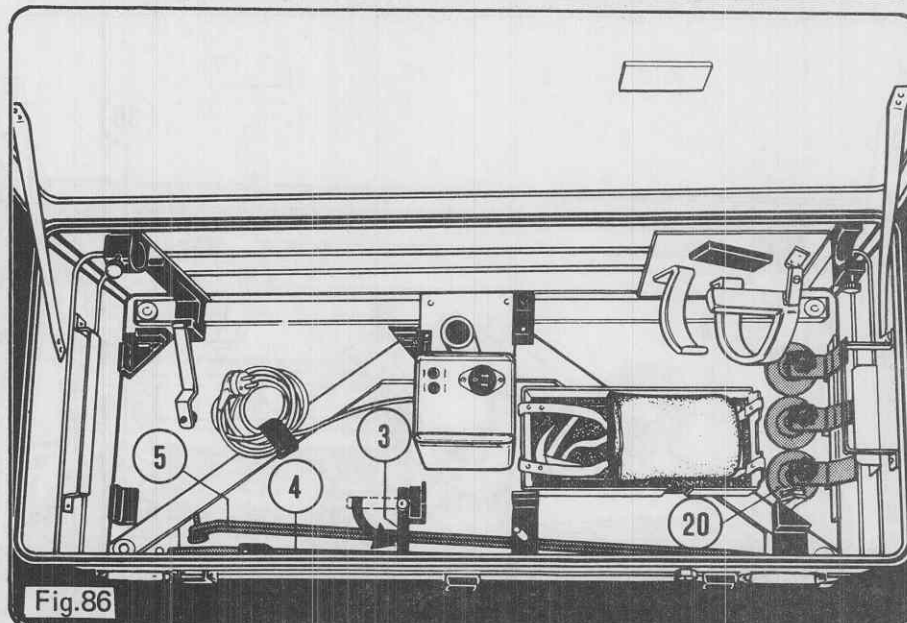
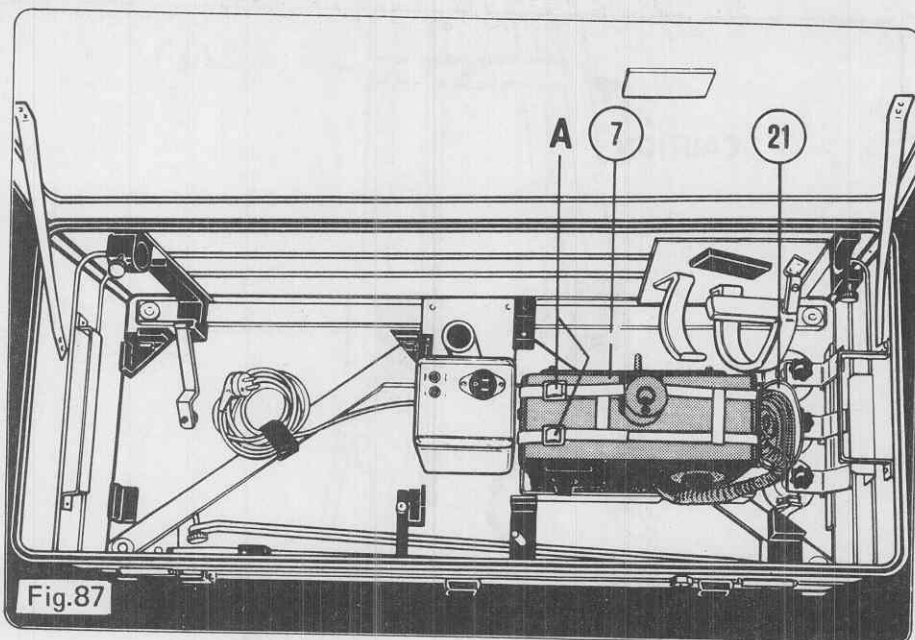
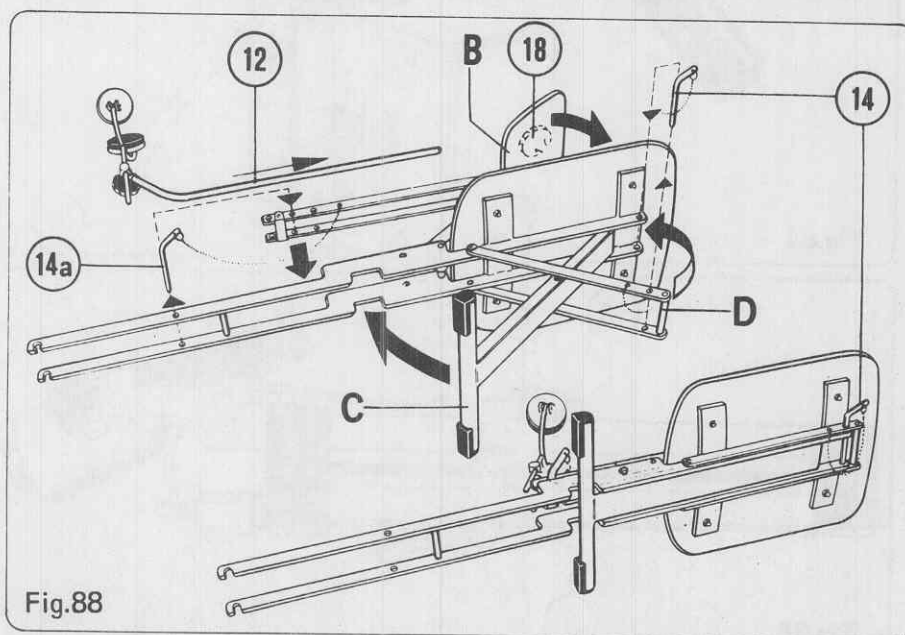


Fig.86



2

Place X-Ray control (7) into cradle, store power cord and exposure cord in pouch (21). Secure control as shown (A).

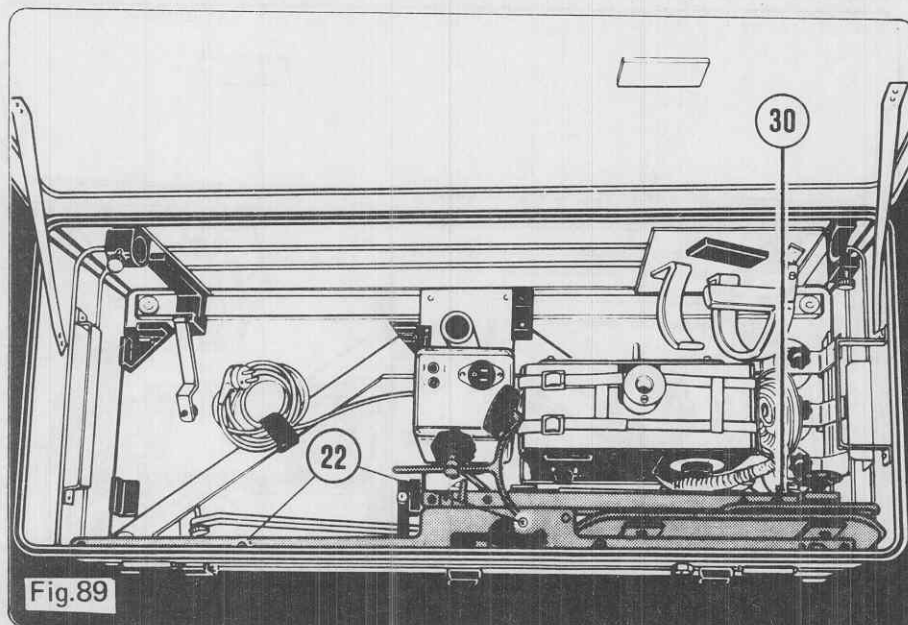


3

Remove headrest assembly (12). Remove pin (14a) and store in backrest brace.

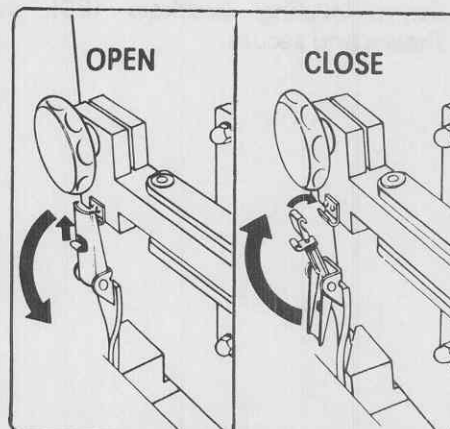
Fold backrest (B). Insert headrest assembly (12) in the direction of arrow, secure with knob (18).

Remove safety pin (14), fold stool leg (C) and retainer bracket (D), secure with safety pin as shown.



4

Place stool assembly into case, watch for dowel pins (22) to engage as shown. Secure (CLOSE) with fastener (30).



5

Raise brackets (24) and (26) OPEN, place scissor arm with X-Ray head into cradle. Secure brackets with fasteners (25) and (27) CLOSE.

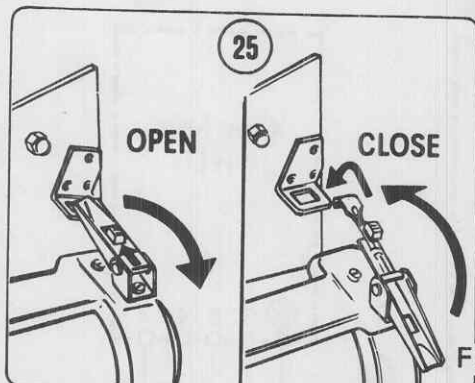
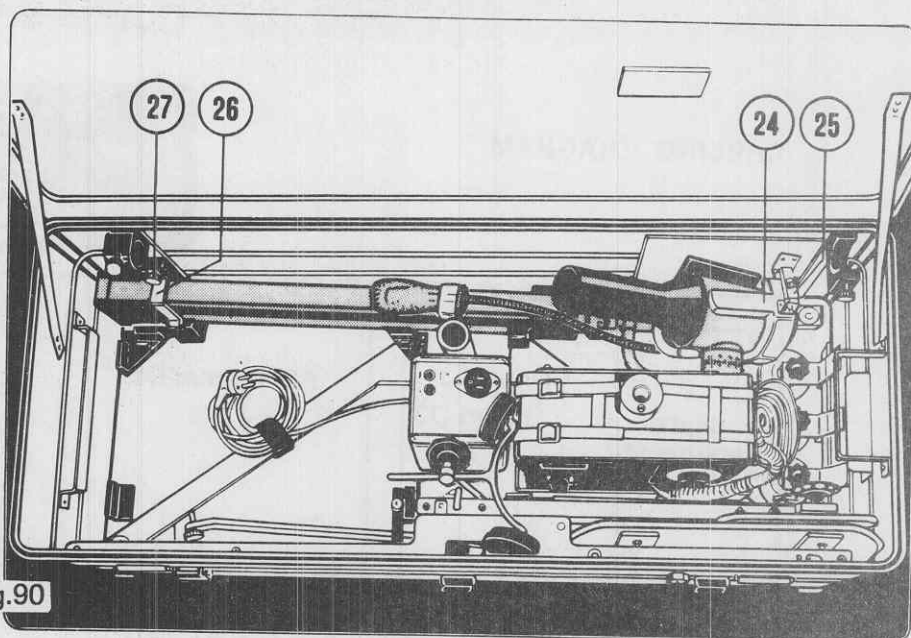


Fig.90



6

Guide upright through grommet (28) as shown, secure both ends to the case with two knurled knobs (29).

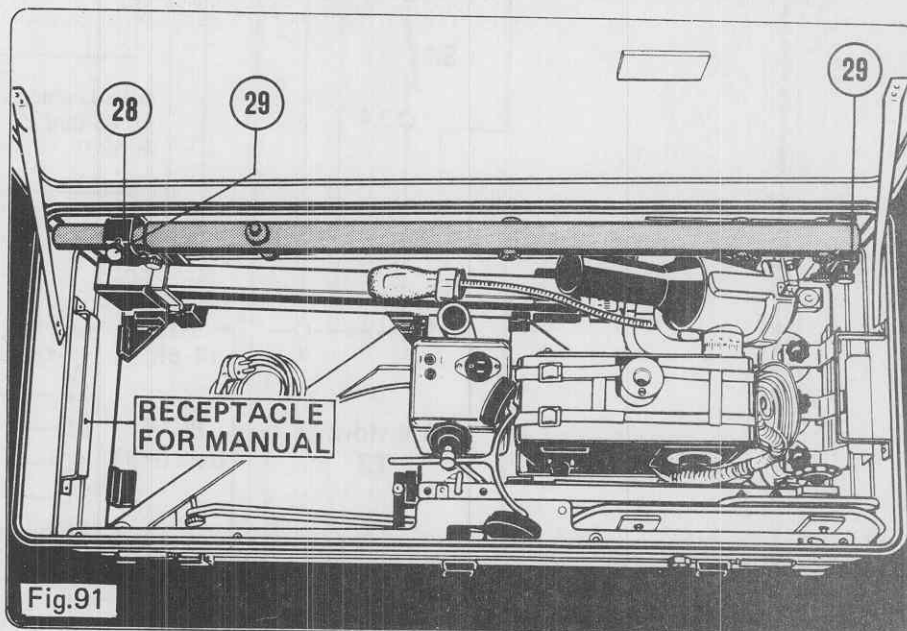
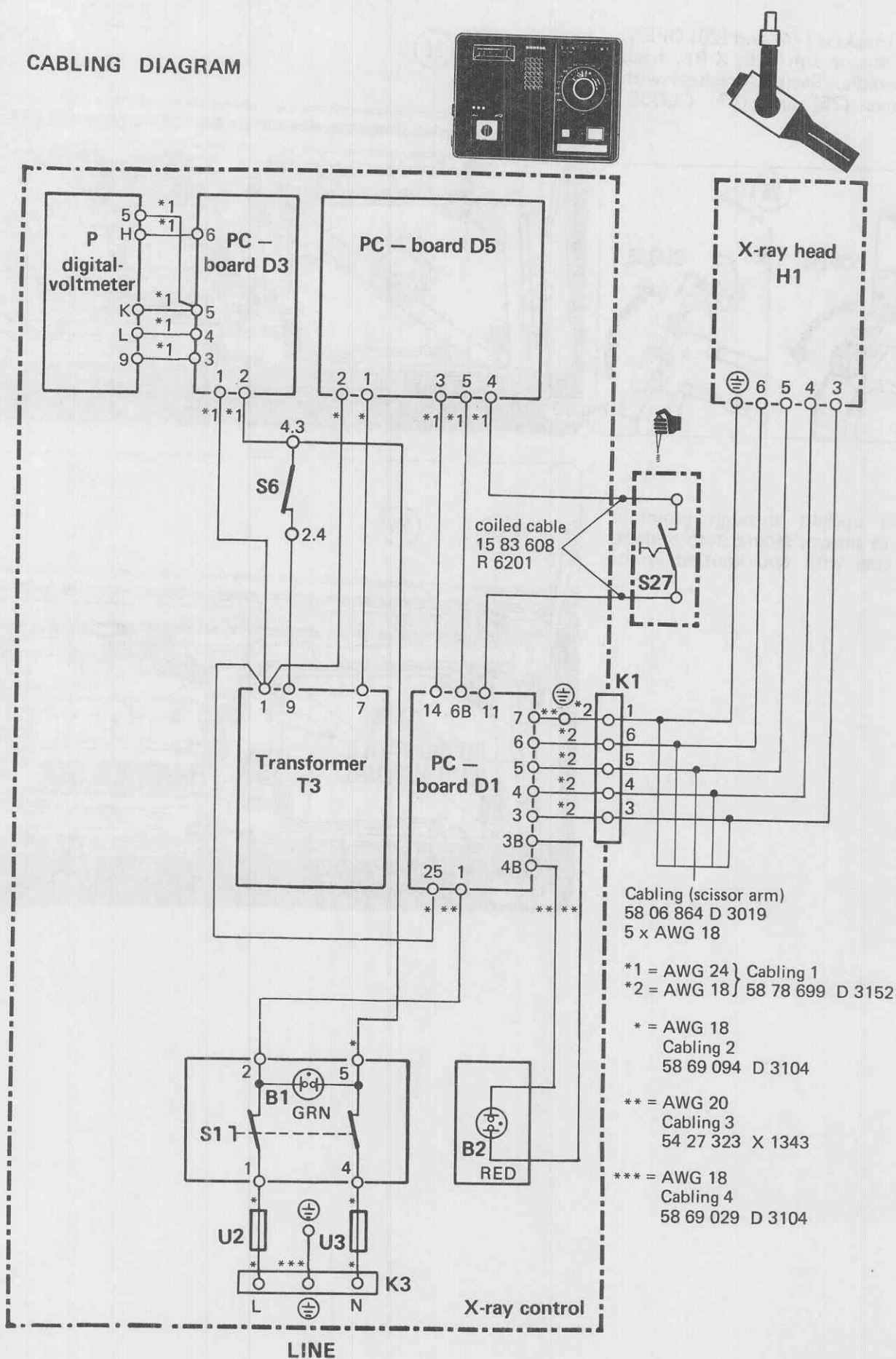


Fig.91

CABLING DIAGRAM



DHHS – STATEMENTS and INFORMATION according to 21 CFR Sub Chapter J

HELIODENT 70 single-tank dental x-ray generator

1020.30 (h) (1) (i)

Instructions for the use of the HELIODENT 70 and precautionary statements are part of the OPERATING INSTRUCTIONS:

1020.30 (h) (1) (ii)

After a period of 12 months the X-ray control must be serviced to keep it in compliance with the DHHS Performance Standard.

See: MAINTENANCE INSTRUCTIONS and/or STORAGE INSPECTION PROCEDURE

Note:

It is the responsibility of the user to insure that the equipment is maintained in compliance with the manufacturer's recommended Maintenance Schedule.

Failure of the user to do so relieves the manufacturer or his agents, from all responsibility in this matter.

1020.30 (h) (2) (i)

Rated maximum peak tube potential	70 kV
leakage technique factors	70 kV/0,12 DCmA
(0,12 mA is the equivalent maximum	
rated continuous tube current for	
7 mA with a duty cycle 1 : 60)	

Minimum filtration in useful beam	2,7 mm Al at 70 kV
-----------------------------------	--------------------

1020.30 (h) (2) (ii)

Cooling curve for the tube housing	page 27
Anode cooling characteristic	page 29

1020.30 (h) (2) (iii)

The tube is designed for self-rectifying mode of operation with the HELIODENT only.

Nominal tube current (fixed)	7 DCmA
Nominal peak tube potential (fixed)	70 kV
Duty cycle	1 : 60 in seconds

1020.30 (h) (3) (i)

	60 HZ	50 HZ
Rated nominal line voltage	125 V 230 V	125 V 230 V
Permissible maximum line-voltage regulation at terminal strip K3	6 V	6 V
Line voltage range	109-133 V 207-242 V	109-132 V 207-240 V

Maximum line current at the nominal values of
70 k V and 7 DCmA

125V: 9.5A 230V: 5.0A	17.0A 9.0A
--------------------------	---------------

1020.30 (h) (3) (v)

Generator duty cycle at the nominal values of 70 kV/ 7 DCmA
Rest minimum 20 sec. between two exposures

1 : 60 in sec.	1 : 60 in sec.
----------------	----------------

1020.30 (h) (3) (vi)

Maximum deviation from indicated values

a. peak tube potential nominal 70 kV	+ 10 kV - 9 kV	+10kV - 9kV
b. tube current nominal 7 DCmA	+ 1,2 DCmA - 2,0 DCmA	+ 1,0 DCmA - 2,5 DCmA
c. exposure time see table		

1020.30 (b) (vii)

Measurement base of technique factors:

- kV measurements have been obtained employing the following methods:
Oscilloscope with frequency compensated bleeder resistors and a spectrum analyzer.
- Tube current is measured by a DCmA-meter, accuracy 1,5 % at full scale.
- The exposure time is measured with an oscilloscope, and is determined by the time of high - voltage without the pre - heat time.

NOMINAL

Exposure time: (DENTOTIME)

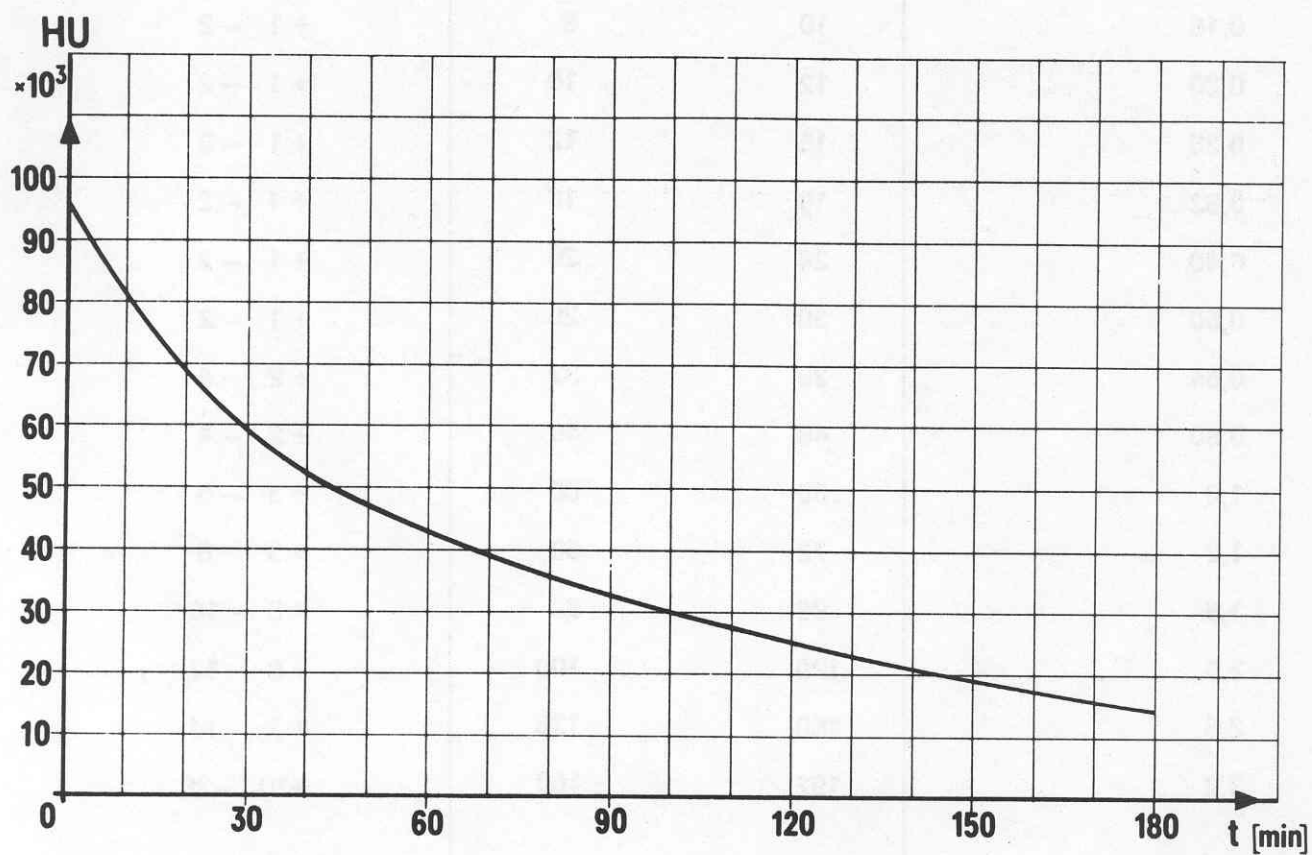
MAXIMUM DEVIATION

Exposure time setting (in seconds)	Equivalent pulses		Accuracy of time setting (in pulses)
	60 HZ	50 HZ	
0,066	4	3	+ 1 - 2
0,083	5	4	+ 1 - 2
0,10	6	5	+ 1 - 2
0,13	8	6	+ 1 - 2
0,16	10	8	+ 1 - 2
0,20	12	10	+ 1 - 2
0,25	15	12	+ 1 - 2
0,32	19	16	+ 1 - 2
0,40	24	20	+ 1 - 2
0,50	30	25	+ 1 - 2
0,64	38	32	+ 2 - 4
0,80	48	40	+ 2 - 4
1,0	60	50	+ 3 - 6
1,2	72	60	+ 3 - 6
1,6	96	80	+ 5 - 10
2,0	120	100	+ 6 - 12
2,5	150	125	+ 7 - 14
3,2	192	160	+ 10 - 20

HELIODENT 70

70 kV, 7 DCmA

Cooling curve for the tube housing



Fixed anode tube for single-tank generators

Technical data

Type	SR 70/7
List number	11 54 269 V 1022
Nominal voltage	70 kV
Optical focal spot	1,0 mm (IEC) 60HZ/ 1,3 mm (IEC) 50HZ
Nominal continuous rating	30W
Anode heat storage capacity	5200 Joule (7000 HU)
Maximum rating	7 DCmA
Filament heating	~1,5A 5,0V
Anode cooling	oil convection cooling
Minimum inherent filtration (Al equivalent)	0,4 mm Al
Type of operation	One peak high potential (without negativ half cycle)
Weight	approx. 2 ozs.
Application	dental radiographs

SIEMENS

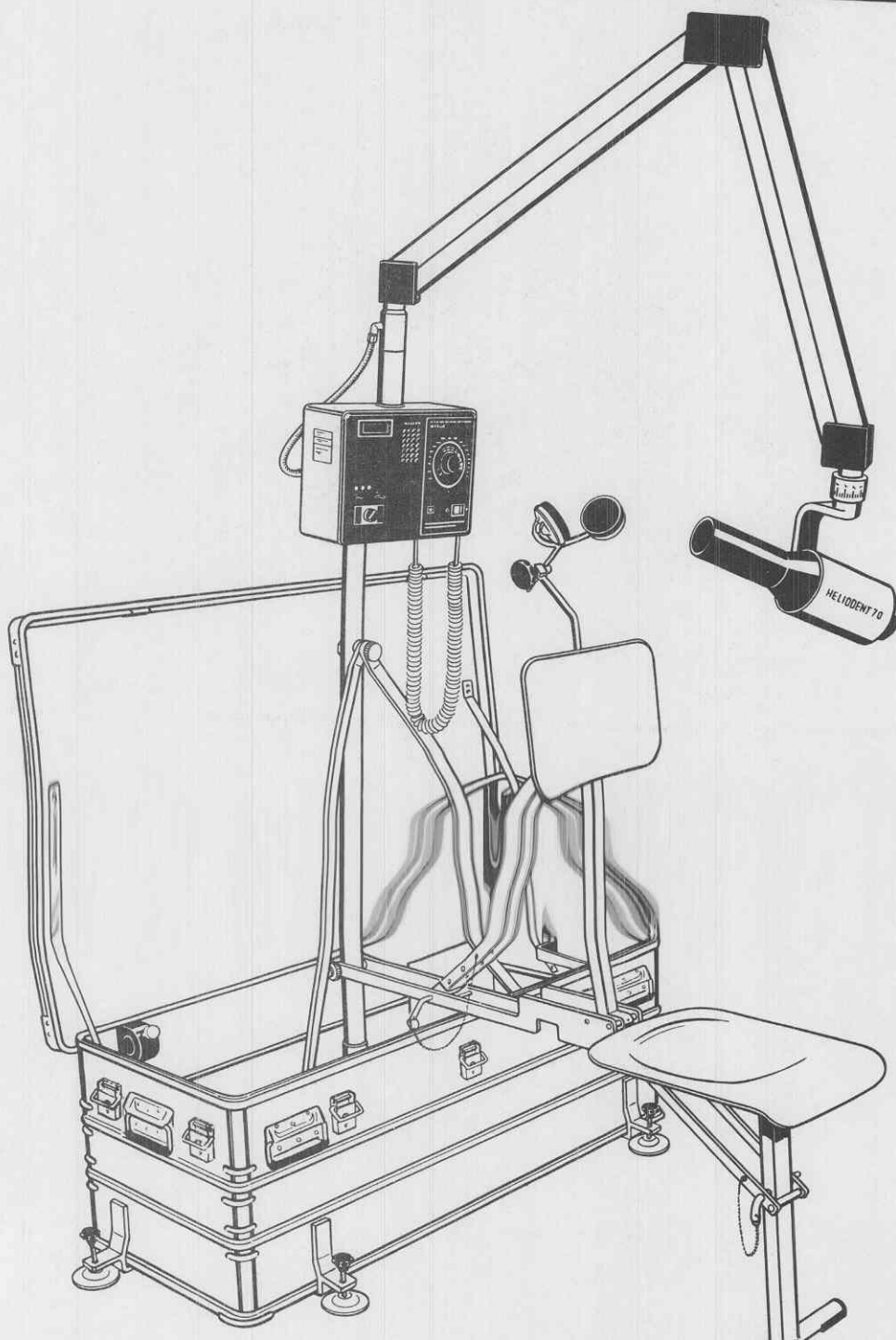
● **PORTARAY**

HELIODENT[®] 70

with **DENTOTIME**

Model D3152 50/60 HZ Operation

List of spare parts

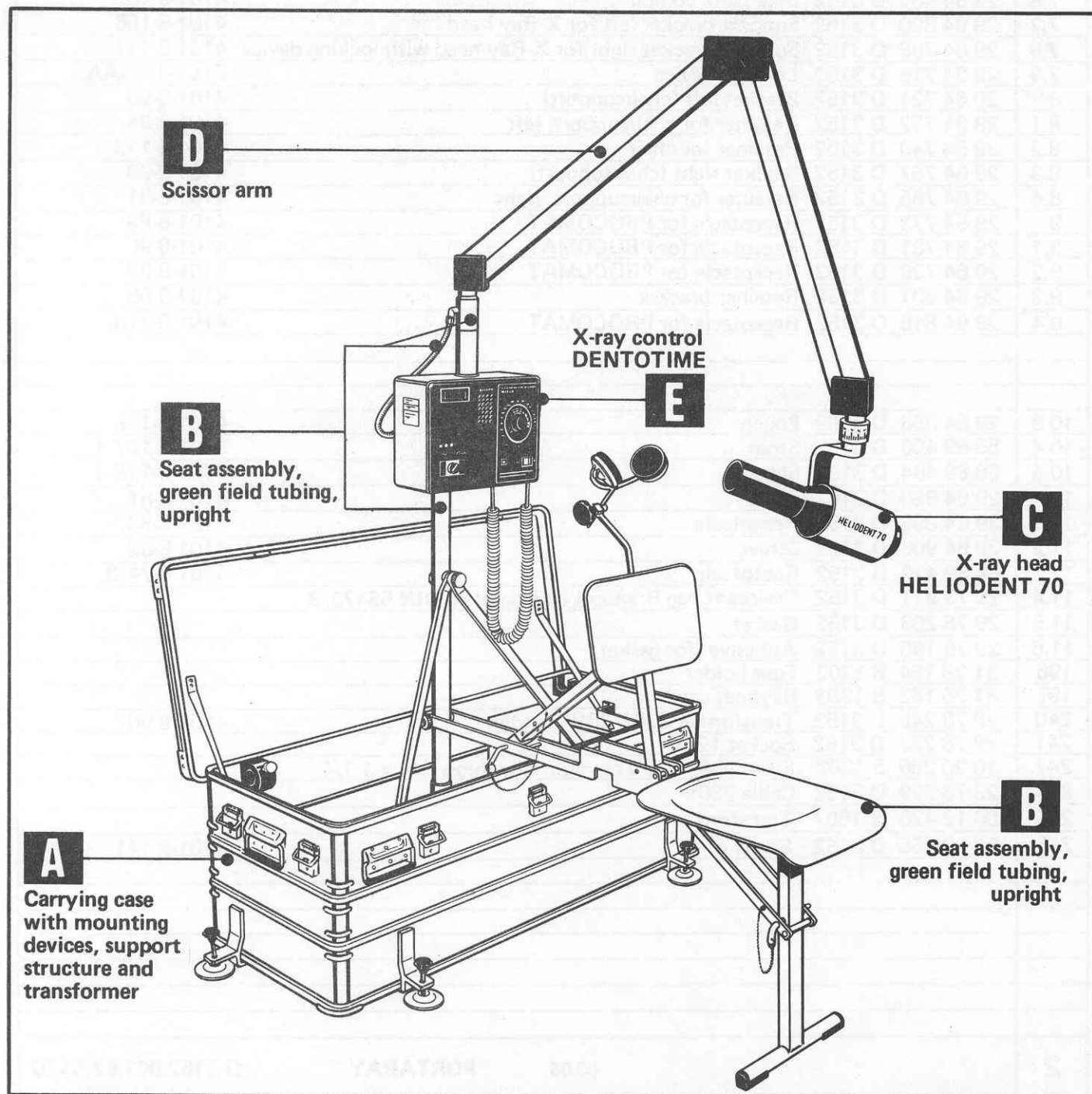


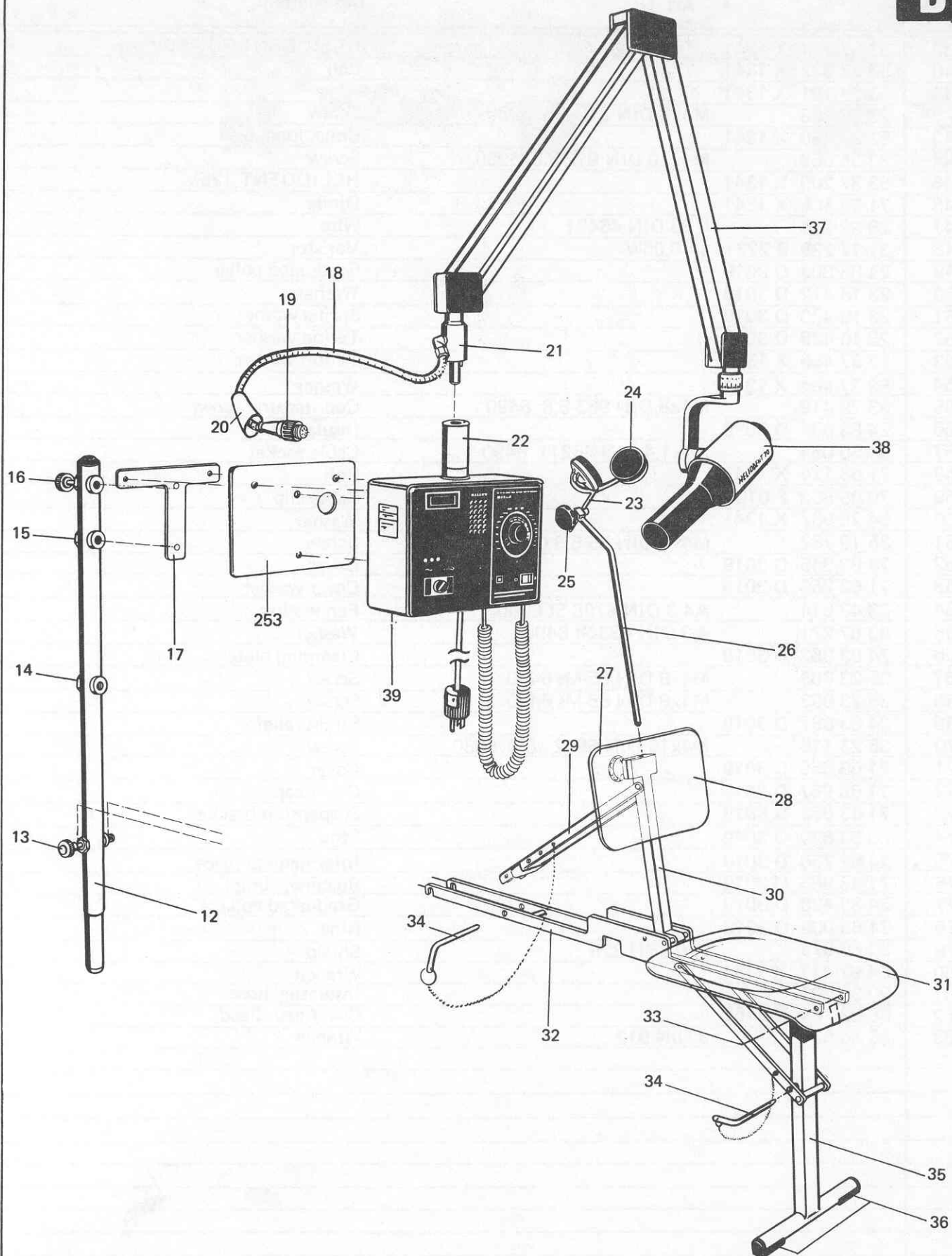
For information

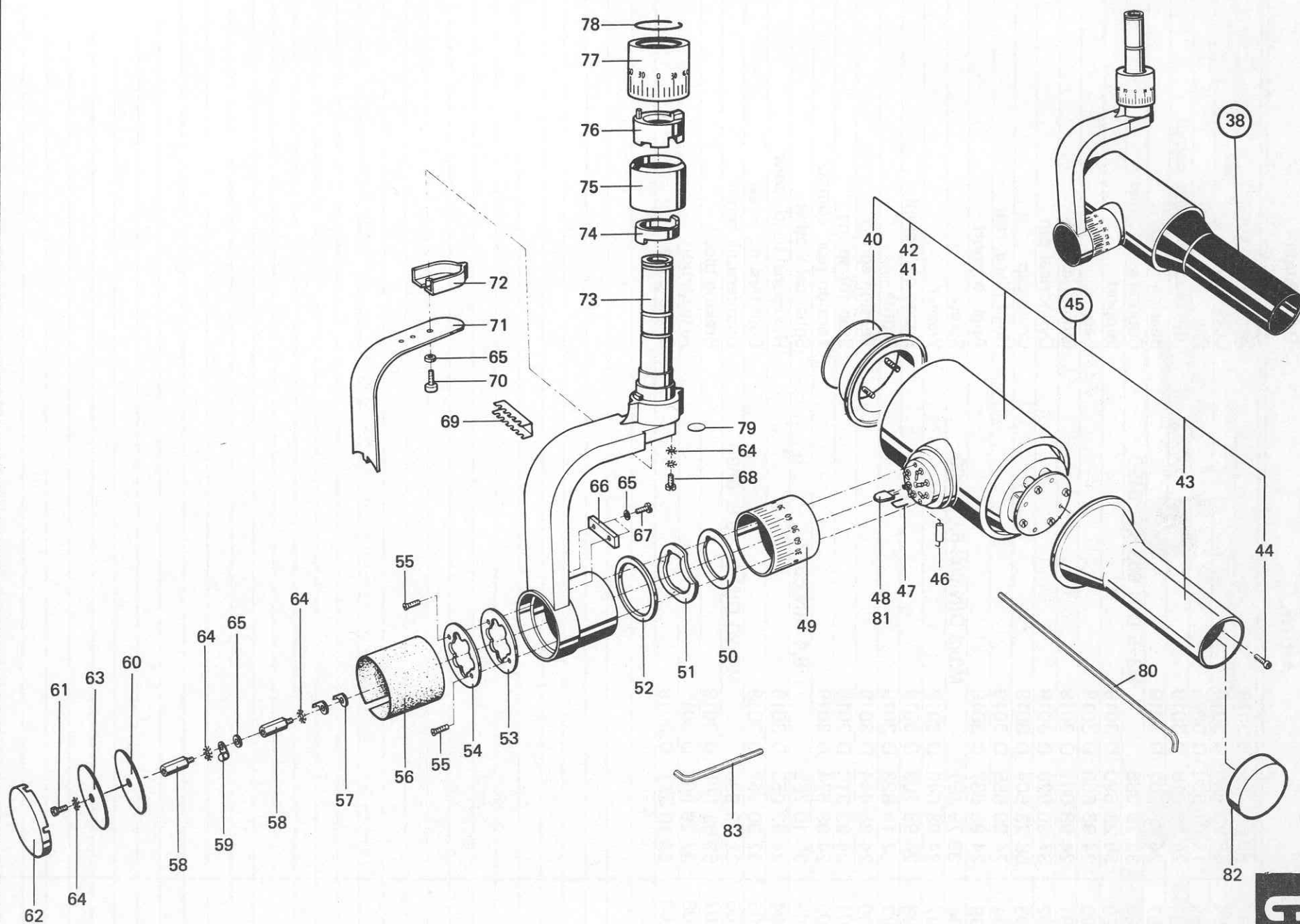
All the components shown in an assembly drawing, which are available as spare parts, have an item number. Under this item number, you will find the article number (= order number) as well as the designation of the article in the opposite piece list.

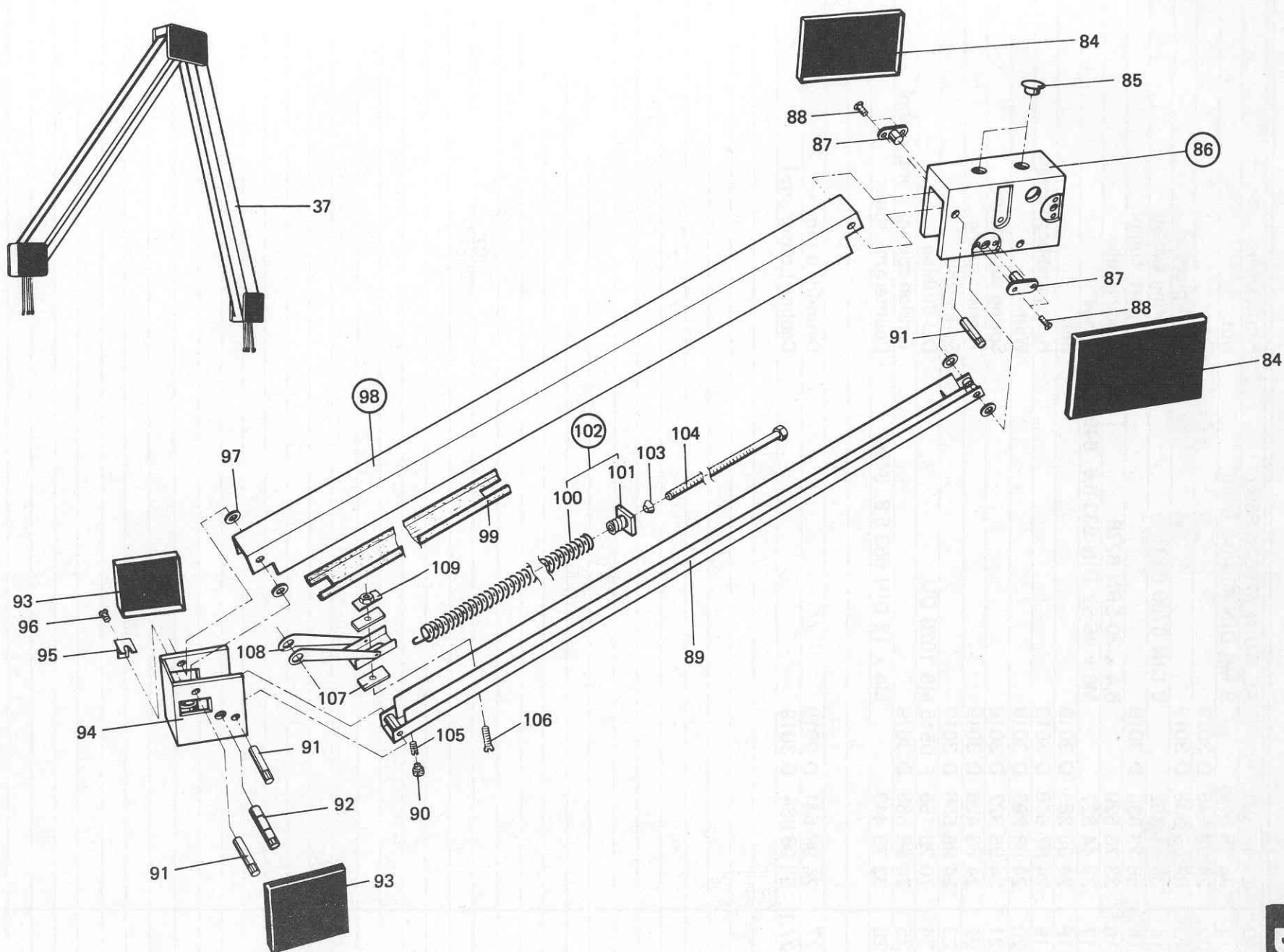
Unit parts shown, whose item numbers are indicated in a circle, are a combination of two or several single parts.

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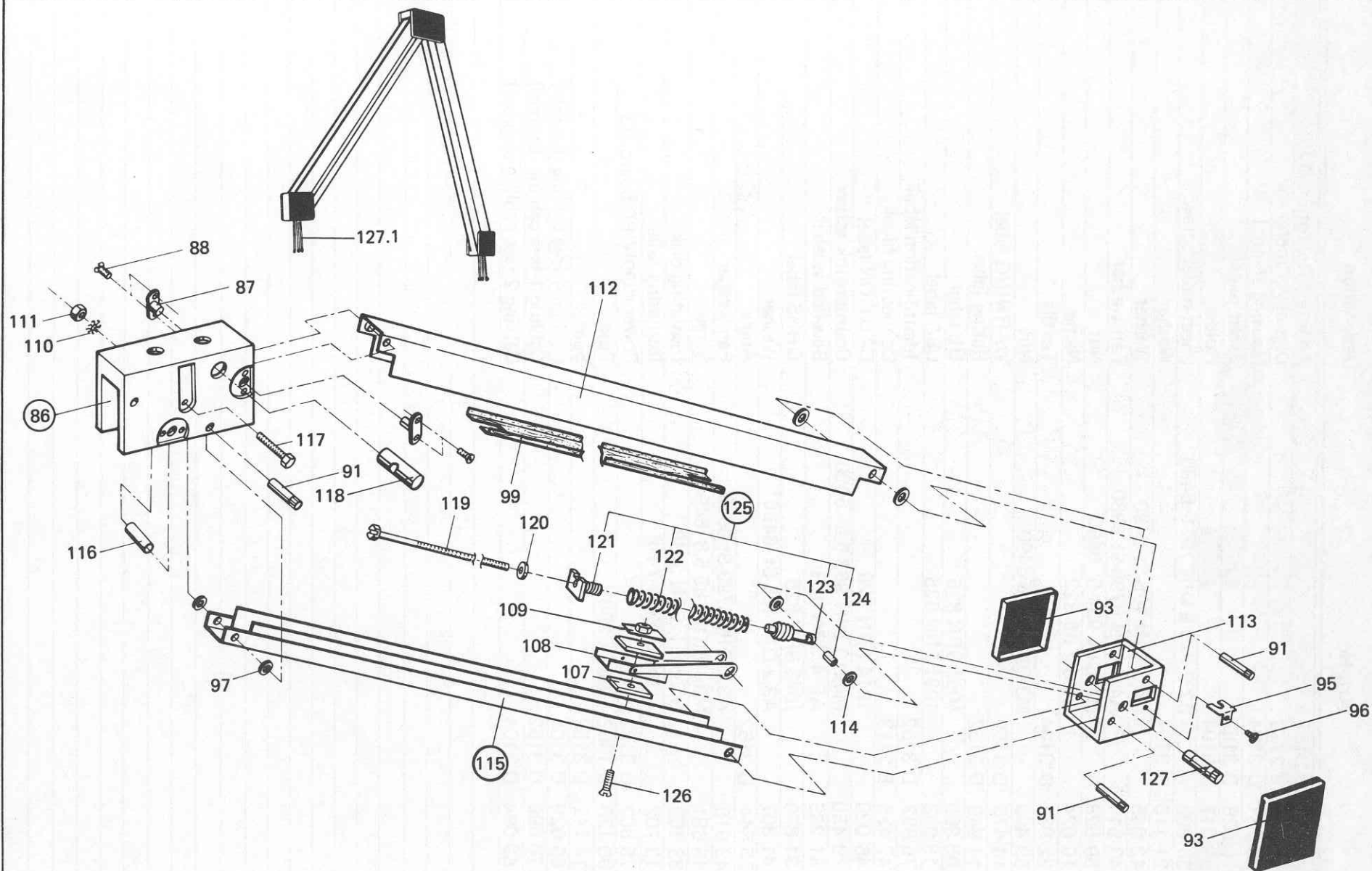


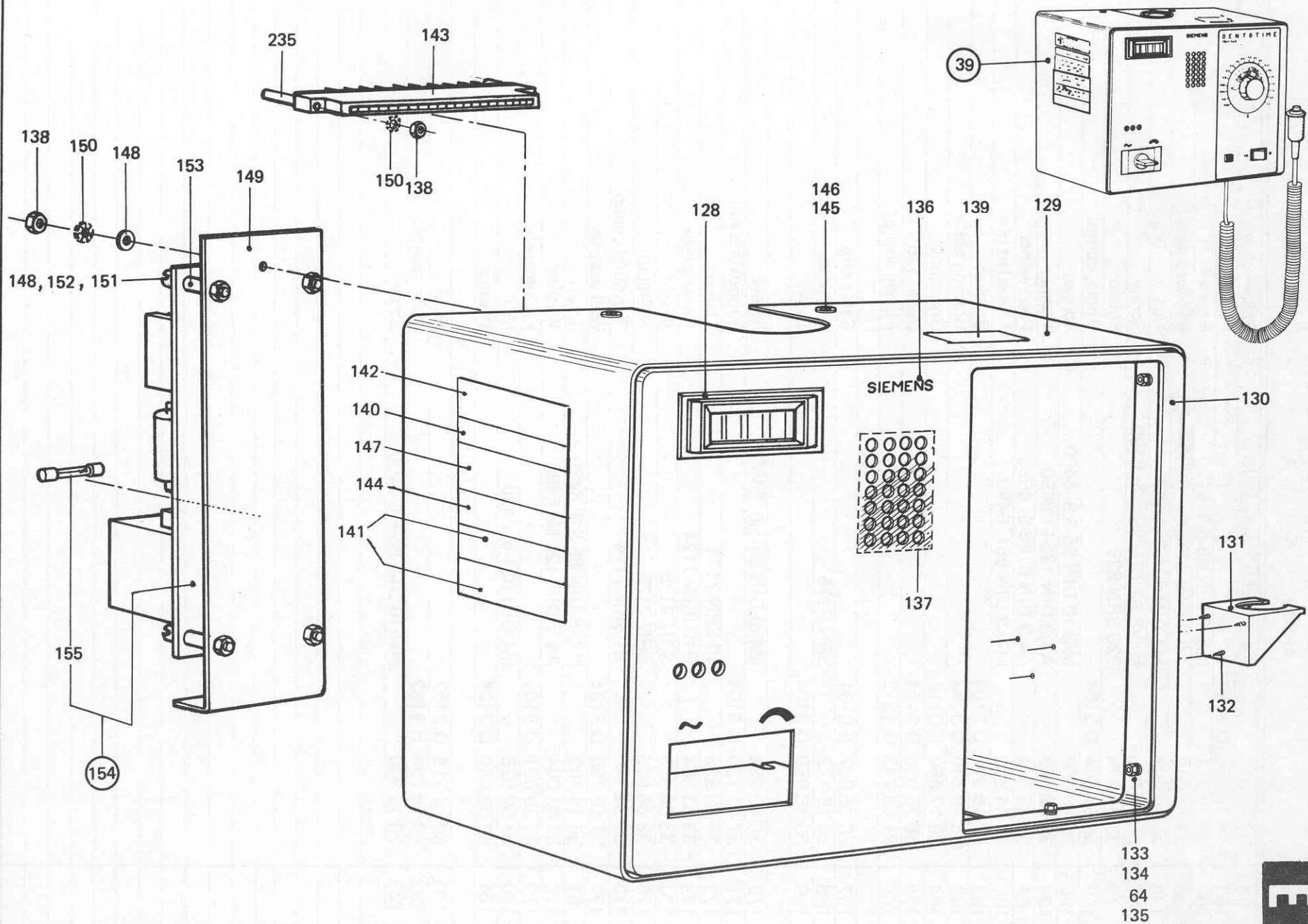




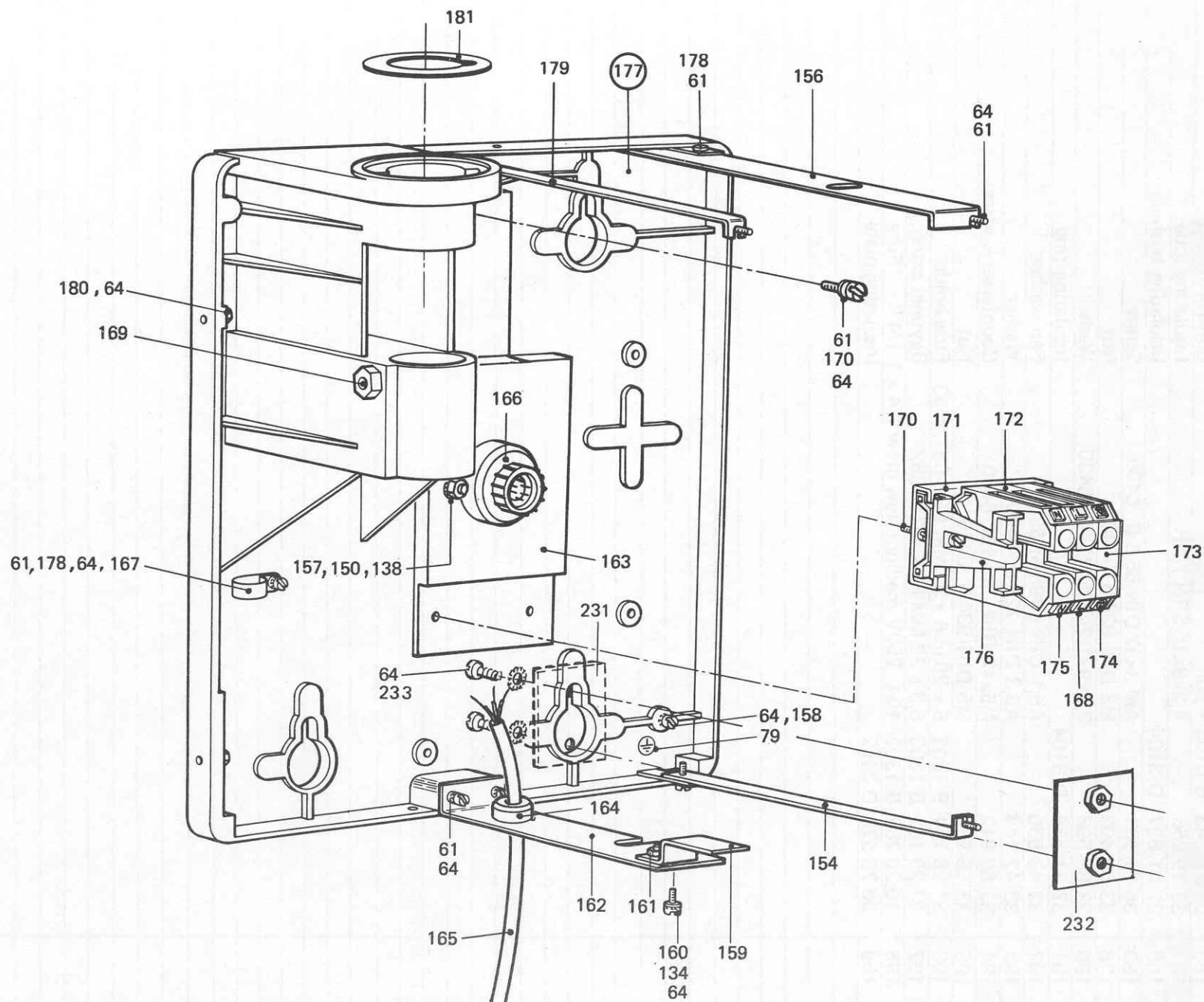


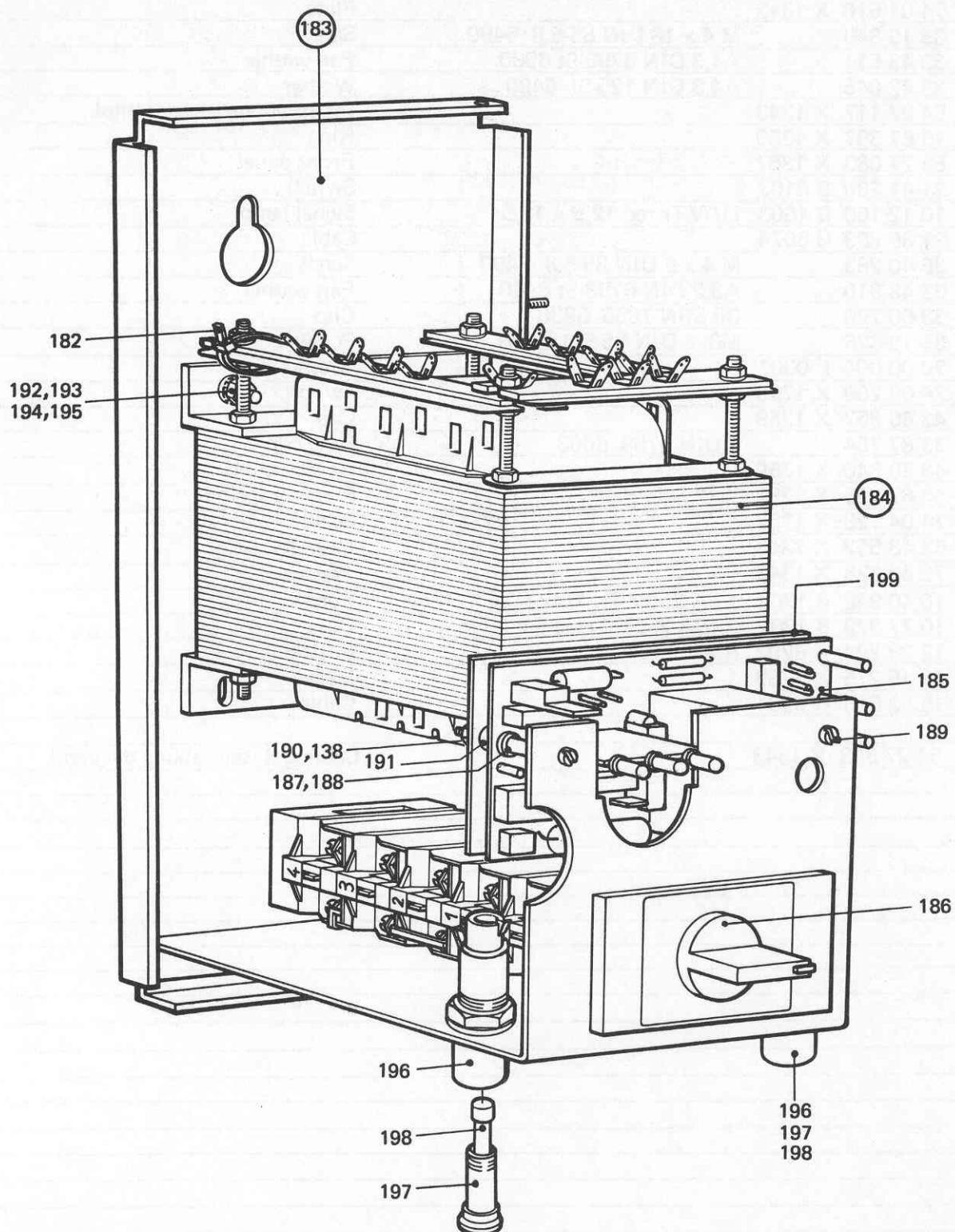
[illegible]

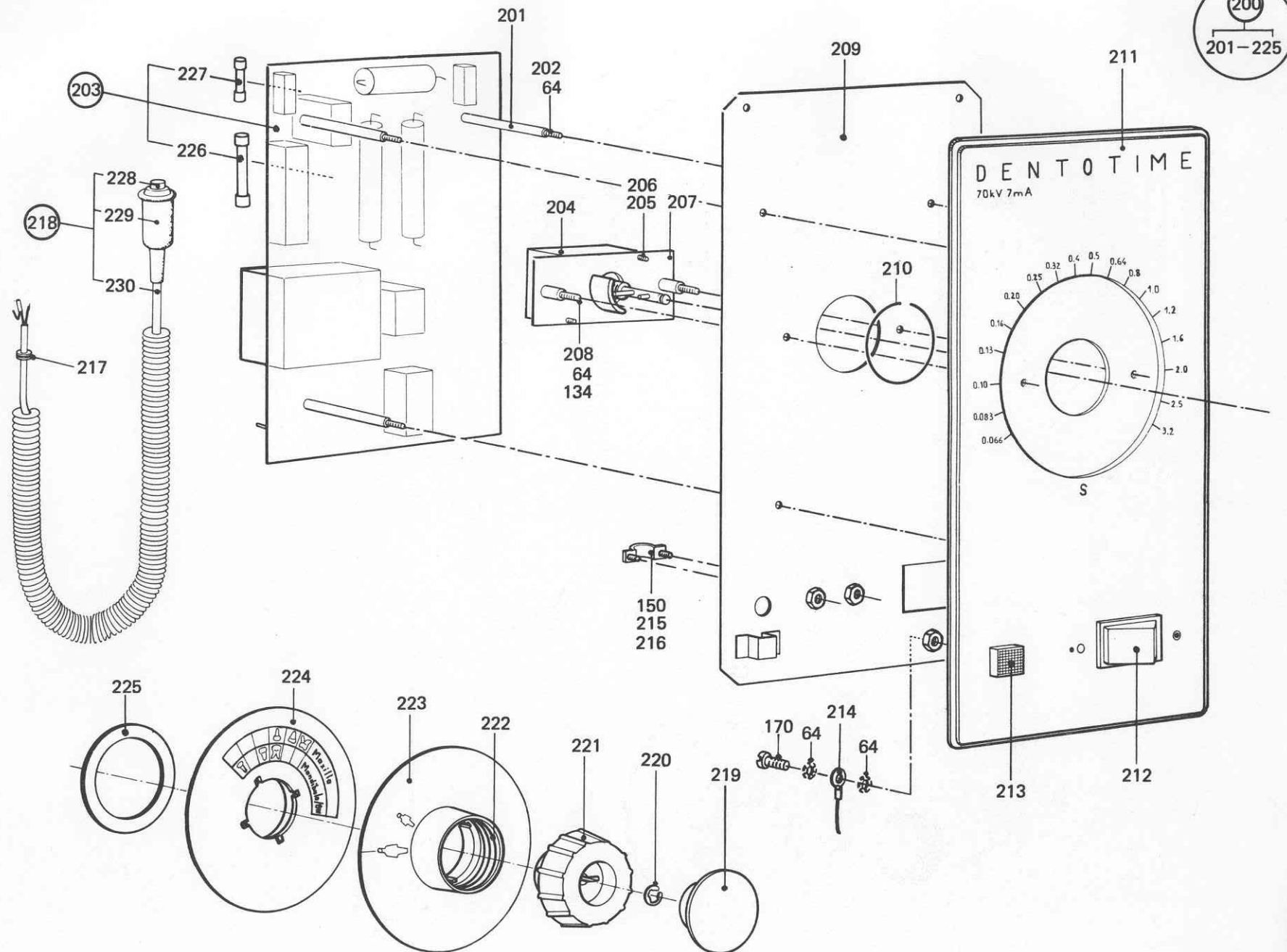




[illegible]



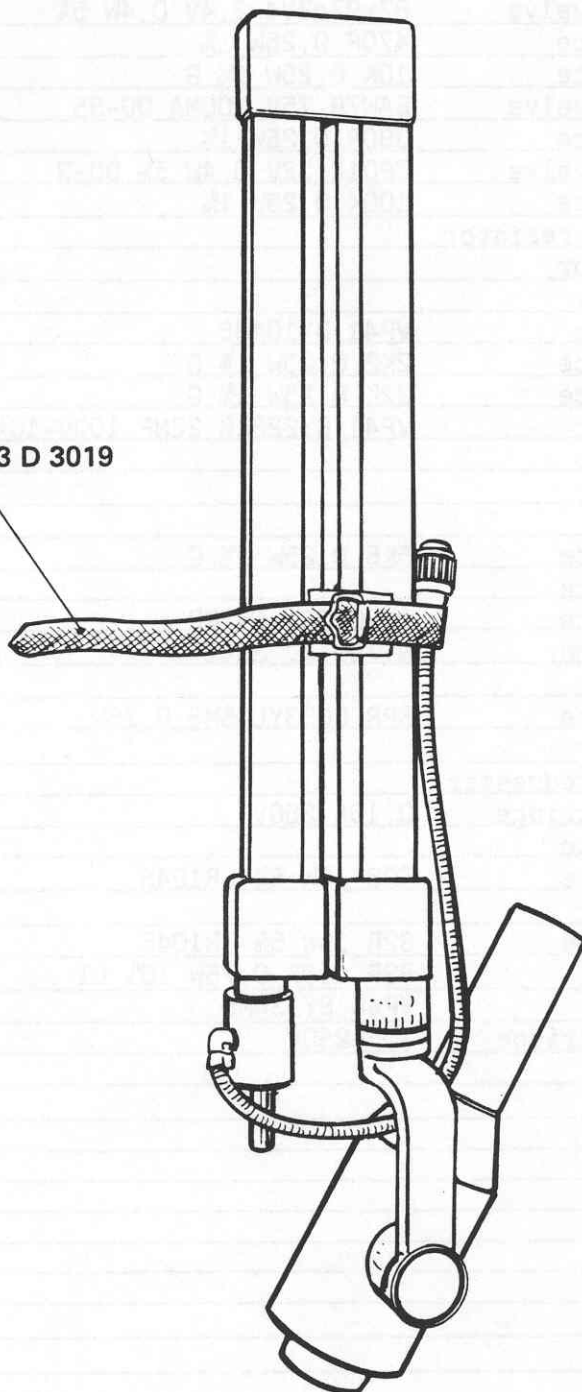




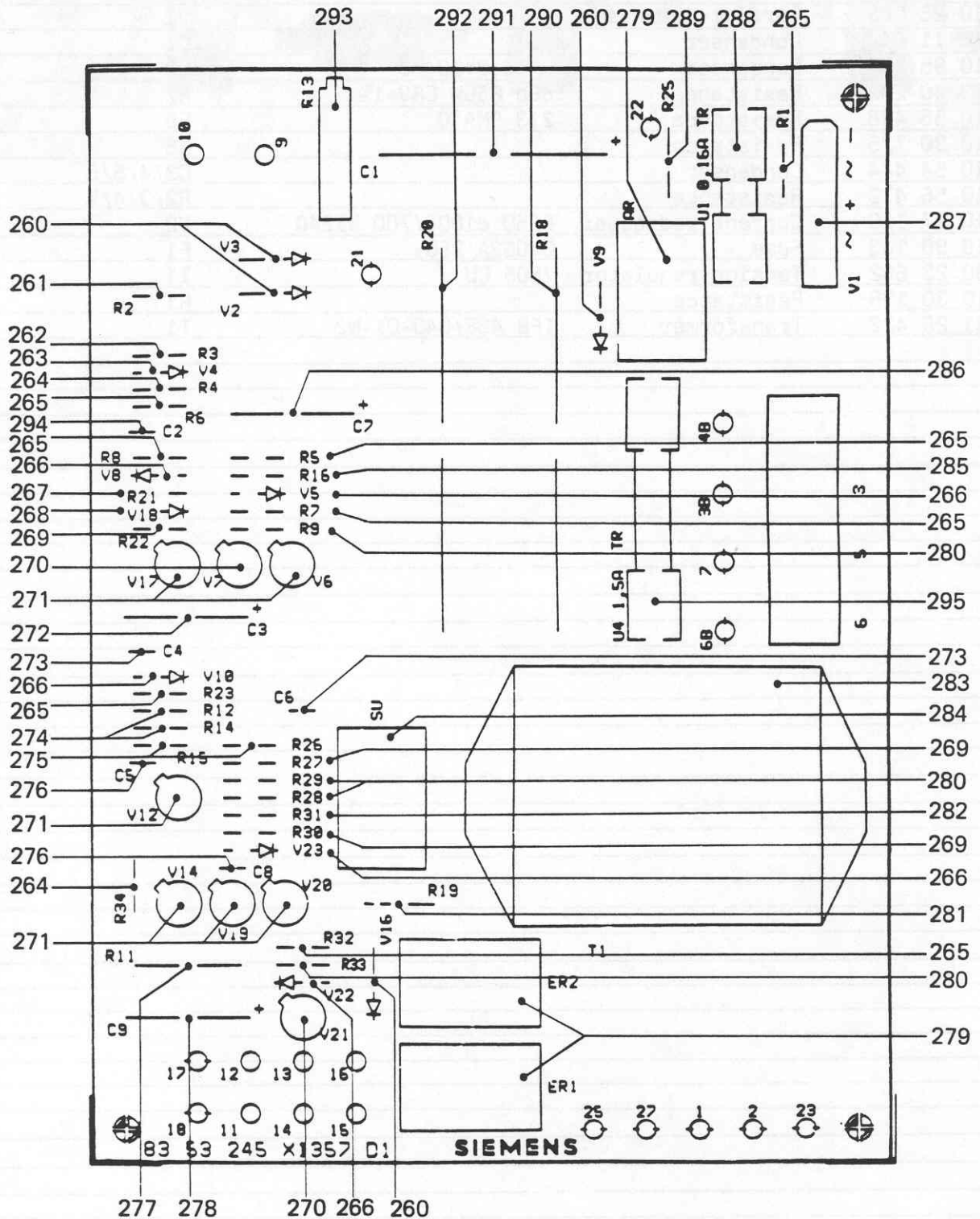
**MAINTENANCE INSTRUCTIONS
SPARE PART LIST
SUPPLEMENT
(FOR GOVT. USE ONLY)**

D

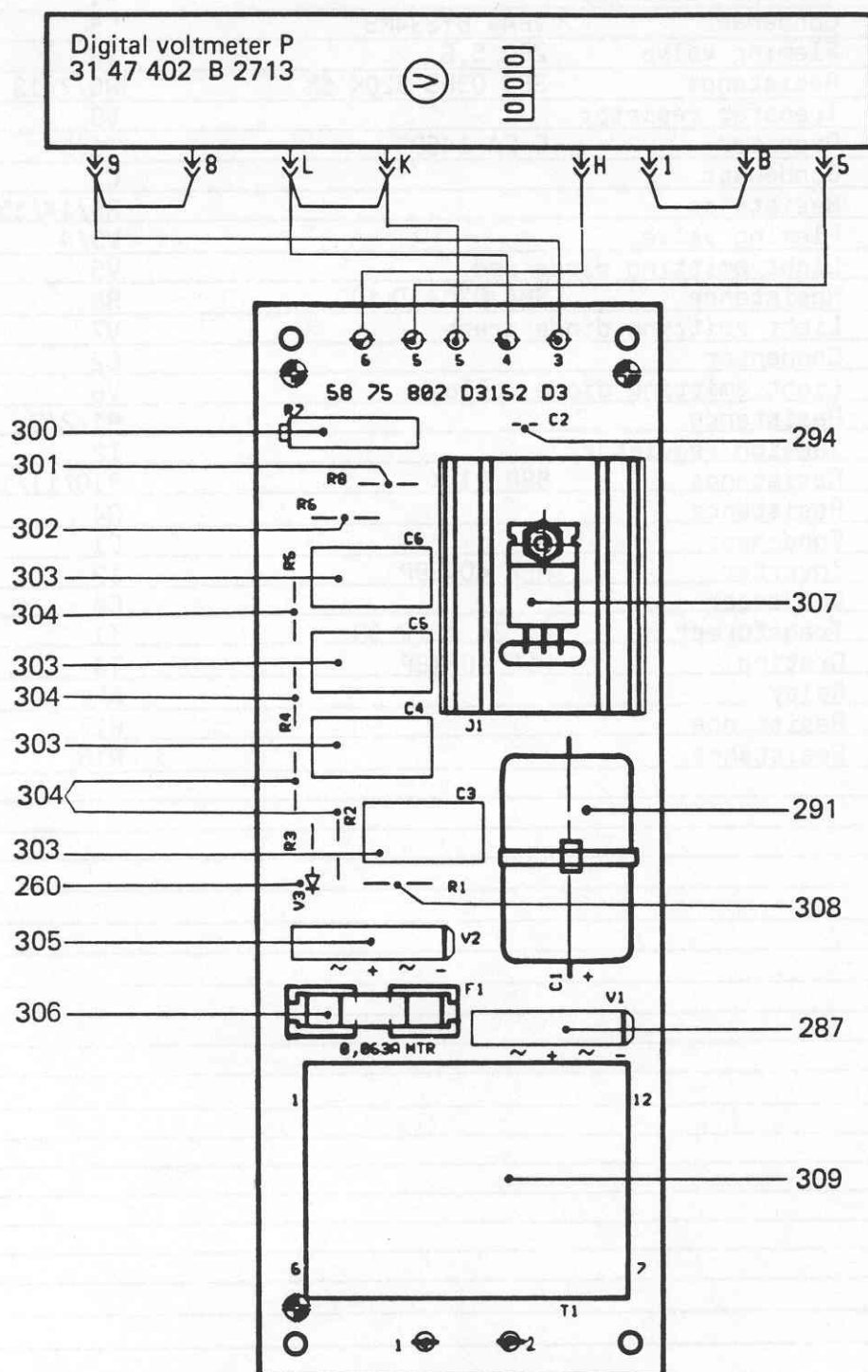
Safety strap
Order No. 26 56 783 D 3019



[illegible]



[illegible]



[illegible]

